# MDS-JE330

# SERVICE MANUAL

Self Diagnostics Supported model

*US Model*
*Canadian Model*
*AEP Model*
*UK Model*
*E Model*
*Australian Model*

US and foreign patents licensed from Dolby Laboratories Licensing Corporation.

| | |
|---|---|
| Model Name Using Similar Mechanism | MDS-JE520 |
| MD Mechanism Type | MDM-5A |
| Optical Pick-up Type | KMS-260A/J1N |

## SPECIFICATIONS

**System** MiniDisc digital audio system

**Disc** MiniDisc

**Laser** Semiconductor laser (λ = 780 nm)
Emission duration: continuous

**Laser output** Less than 44.6 µW*

* This output is the value measured at a distance of 200 mm from the objective lens surface on the Optical Pick-up Block with 7 mm aperture.

**Laser diode** Material: GaAlAs

**Revolutions (CLV)** 400 rpm to 900 rpm

**Error correction** Advanced Cross Interleave Reed Solomon Code (ACIRC)

**Sampling frequency** 44.1 kHz

**Coding** Adaptive Transform Acoustic Coding (ATRAC)

**Modulation system** EFM (Eight-to-Fourteen Modulation)

**Number of channels** 2 stereo channels

**Frequency response** 5 to 20,000 Hz ±0.3 dB

**Signal-to-noise ratio** Over 94 dB during playback

**Wow and flutter** Below measurable limit

### Inputs

**LINE (ANALOG) IN**
Jack type: phono
Impedance: 47 kilohms
Rated input: 500 mVrms
Minimum input: 125 mVrms

**DIGITAL (OPTICAL) IN**
Connector type: square optical
Impedance: 660 nm (optical wave length)

### Outputs

**LINE (ANALOG) OUT**
Jack type: phono
Rated output: 2 Vrms (at 50 kilohms)
Load impedance: Over 10 kilohms

— Continued on next page —

MINIDISC DECK

MICROFILM

SONY

### General

**Power requirements**

| Where purchased | Power requirements |
|---|---|
| U.S.A. and Canada | 120 V AC, 60 Hz |
| U.K. and Continental Europe | 220 - 230 V AC, 50/60 Hz |
| Australia | 240 V AC, 50/60 Hz |
| Certain countries in Asia | 220 - 240 V AC, 50/60 Hz |
| Other countries | 110 - 120 or 220 - 240 V AC selectable, 50/60 Hz |

| | |
|---|---|
| **Power consumption** | 22 W |
| **Dimensions (approx.)** | 430 × 95 × 290 mm (17 × 3 3/4 × 11 1/2 inches) (w/h/d) incl. projecting parts and controls |
| **Mass (approx.)** | 3.5 kg (7 lb 20 oz) |

### Supplied accessories

- Audio connecting cords (2)
- Optical cable (1)
- Remote commander (remote) RM-D29M (1)
- R6 (size-AA) batteries (2)

Design and specifications are subject to change without notice.

## SELF-DIAGNOSIS FUNCTION

The self-diagnosis function consists of error codes for customers which are displayed automatically when errors occur, and error codes which show the error history in the test mode during servicing. For details on how to view error codes for the customer, refer to the following box in the instruction manual. For details on how to check error codes during servicing, refer to the following "Procedure for using the Self-Diagnosis Function (Error History Display Mode)".

### Self-Diagnosis Function

The deck's self-diagnosis function automatically checks the condition of the MD deck when an error occurs, then issues a three-digit code and an error message on the display. If the code and message alternate, find them in the following table and perform the indicated countermeasure. Should the problem persist, consult your nearest Sony dealer.

| Three-digit code/Message | Cause/Remedy |
|---|---|
| C11/Protected | The inserted MD is record-protected.<br>➡ Take out the MD and close the record-protect slot (page 15). |
| C13/REC Error | The recording was not made properly.<br>➡ Set the deck in a stable surface, and repeat the recording procedure. |
| | The inserted MD is dirty (with smudges, fingerprints, etc.), scratched, or substandard in quality.<br>➡ Replace the disc and repeat the recording procedure. |
| C13/Read Error | The deck could not read the TOC on the MD properly.<br>➡ Take out the MD and insert it again. |
| C14/TOC Error | The deck could not read the TOC on the MD properly.<br>➡ Insert another disc.<br>➡ If possible, erase all the tracks on the MD (page 30). |
| C71/Din Unlock | The sporadic appearance of this message is caused by the digital signal being recorded. This will not affect the recording. |
| | While recording from a digital component connected through the DIGITAL (OPTICAL) IN connector, the digital connecting cable was unplugged or the digital component turned off.<br>➡ Connect the cable or turn the digital component back on. |

#### Procedure for using the Self-Diagnosis Function (Error History Display Mode).

**Note:** Perform the self-diagnosis function in the "error history display mode" in the test mode. The following describes the least required procedure. Be careful not to enter other modes by mistake. If you set other modes accidentally, press the MENU/NO button to exit the mode.

1. While pressing the AMS knob and ■ button, connect the power plug to the outlet, and release the AMS knob and ■ button.
2. Rotate the AMS knob and when "[Service]" is displayed, press the YES button.
3. Rotate the AMS knob and display "ERR DP MODE".
4. Pressing the YES button sets the error history mode and displays "total rec".
5. Select the contents to be displayed or executed using the AMS knob.
6. Pressing the AMS knob will display or execute the contents selected.
7. Pressing the AMS knob another time returns to step 4.
8. Pressing the MENU/NO button displays "ERROR DP MODE" and exits the error history mode.
9. To exit the test mode, press the REPEAT button. The unit sets into the STANDBY state, the disc is ejected, and the test mode ends.

## ITEMS OF ERROR HISTORY MODE ITEMS AND CONTENTS

### Selecting the Test Mode

| Display | Details of History |
|---|---|
| total rec | Displays the recording time.<br>Displayed as "r□□□□□□h".<br>The displayed time is the total time the laser is set to the high power state.<br>This is about 1/4 of the actual recording time.<br>The time is displayed in decimal digits from 0h to 65535h. |
| total play | Displays the play time.<br>Displayed as "p□□□□□□h". The time displayed is the total actual play time. Pauses are not counted.<br>The time is displayed in decimal digits from 0h to 65535h. |
| retry err | Displays the total number of retries during recording and number of retry errors during play.<br>Displayed as "r□□ p□□".<br>"r" indicates the retries during recording while "p" indicates the retry errors during play.<br>The number of retries and retry errors are displayed in hexadecimal digits from 00 to FF. |
| total err | Displays the total number of errors.<br>Displayed as "total □□".<br>The number of errors is displayed in hexadecimal digits from 00 to FF. |
| err history | Displays the 10 latest errors.<br>Displayed as "0□ E@@".<br>□ indicates the history number. The smaller the number, the more recent is the error. (00 is the latest).<br>@@ indicates the error code.<br>Refer to the following table for the details. The error history can be switched by rotating the AMS knob. |
| er refresh | Mode which erases the "retry err", "total err", and "err history" histories.<br>When returning the unit to the customer after completing repairs, perform this to erase the past error history,<br>After pressing the AMS button and "er refresh?" is displayed, press the YES button to erase the history.<br>"Complete!" will be displayed momentarily.<br>Be sure to check the following when this mode has been executed.<br>• The data has been erased.<br>• The mechanism operates normally when recording and play are performed. |
| tm refresh | Mode which erases the "total rec" and "total play" histories.<br>These histories serve as approximate indications of when to replace the optical pickup.<br>If the optical pickup has been replaced, perform this operation and erase the history.<br>After pressing the AMS button and "tm refresh?" is displayed, press the YES button to erase the history.<br>"Complete!" will be displayed momentarily.<br>Be sure to check the following when this mode has been executed.<br>• The data has been erased.<br>• The mechanism operates normally when recording and play are performed. |

### Table of Error Codes

| Error Code | Details of Error | Error Code | Details of Error |
|---|---|---|---|
| E00 | No error | E05 | FOK has deviated |
| E01 | Read error. PTOC cannot be read (DISC ejected) | E06 | Cannot focus (Servo has deviated) |
| | | E07 | Recording retry |
| E02 | TOC error. UTOC error (DISC not ejected) | E08 | Recording retry error |
| | | E09 | Playback retry error (Access error) |
| E03 | Loading error | | |
| E04 | Address cannot be read (Servo has deviated) | E0A | Play retry error (C2 error) |

**CAUTION**

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the equipment manufacturer.
Discard used batteries according to manufacture's instructions.

**ADVARSEL!**

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

**ADVARSEL**

Eksplosjonsfare ved feilakting skifte av batteri.
Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
Brukte batterier katterier kasseres i henhold til fabrikantens

**VARNIG**

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreakrifter.

**VAROITUS**

Parist voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Laser component in this product is capable of emitting radiation exceeding the limit for Class 1.

This appliance is classified as a CLASS 1 LASER product. The CLASS 1 LASER PRODUCT MARKING is located on the rear exterior.

CAUTION : INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED. AVOID EXPOSURE TO BEAM.
ADVARSEL : USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSAETTELSE FOR STRÅLING.
VORSICHT : UNSICHTBARE LASERSTRAHLUNG. WENN ABDECKUNG GEÖFFNET UND SICHEREITSVERRIEGELUNG ÜBERBRÜCKT. NICHT DEM STRAHL AUSSETZEN.
VARO! : AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.
VARNING : OSYNLING LASERSTRÅLING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN.
ADVERSEL : USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES OG SIKKERHEDSLÅS BRYTES. UNNGÅ EKSPONERING FOR STRÅLEN.
VIGYAZAT! : A BURKOLAT NYITÁSAKOR LÁTHATATLAN LÉZERSUGÁRVESZÉLY! KERÜLJE A BESUGÁRZÁST!

This caution label is located inside the unit.

**CAUTION**
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

### Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

### Flexible Circuit Board Repairing

- Keep the temperature of soldering iron around 270˚C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

**SAFETY-RELATED COMPONENT WARNING !!**

**COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.**

**ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!!**

**LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.**

## SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:
Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

### LEAKAGE

The AC leakage from any exposed metal part to earth Ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microampers). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2V AC range are suitable. (See Fig. A)

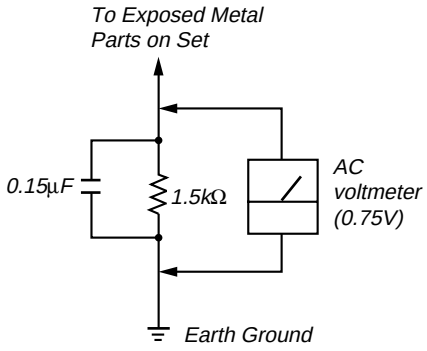
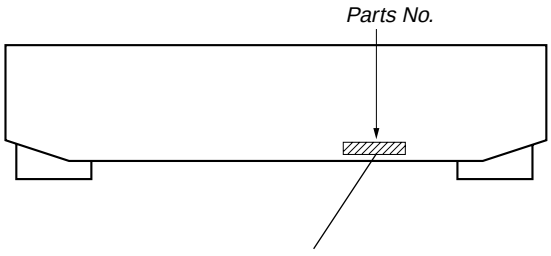



***Fig. A. Using an AC voltmeter to check AC leakage.***

### MODEL IDENTIFICATION
### — BACK PANEL —




4-216-349-0☐ US model
4-216-349-1☐ Canadian model
4-216-349-2☐ AEP, UK model
4-216-349-3☐ Australian model
4-216-349-4☐ Singapore model
4-216-349-5☐ Hong Kong model

## TABLE OF CONTENTS

**1. SERVICING NOTE** ..... 6

**2. GENERAL** ..... 11

**3. DISASSEMBLY**
3-1. Case and Front Panel ..... 12
3-2. Slider (Cam) ..... 12
3-3. Base Unit (MBU-5A) and BD Board ..... 13
3-4. SW Board and Loading Motor (M103) ..... 13

**4. TEST MODE** ..... 14

**5. ELECTRICAL ADJUSTMENTS** ..... 19

**6. DIAGRAMS**
6-1. Circuit Boards Location ..... 28
6-2. Block Diagrams
• BD Section ..... 29
• Main Section ..... 31
6-3. Printed Wiring Board – BD Section – ..... 35
6-4. Schematic Diagram – BD Section – (1/2) ..... 37
Schematic Diagram – BD Section – (2/2) ..... 39
6-5. Schematic Diagram – Main Section – (1/2) ..... 41
Schematic Diagram – Main Section – (2/2) ..... 43
6-6. Printed Wiring Board – Main Section – ..... 45
6-7. Printed Wiring Board – Panel Section – ..... 47
6-8. Schematic Diagram – Panel Section – ..... 49
6-9. Schematic Diagram – BD Switch Section – ..... 51
6-10. Printed Wiring Board – BD Switch Section – ..... 51
6-11. IC Block Diagrams ..... 52
6-12. IC Pin Functions ..... 55

**7. EXPLODED VIEWS**
7-1. Case and Back Panel Section ..... 61
7-2. Front Panel Section ..... 62
7-3. Mechanism Section (MDM-5A) ..... 63
7-4. Base Unit Section (MBU-5A) ..... 64

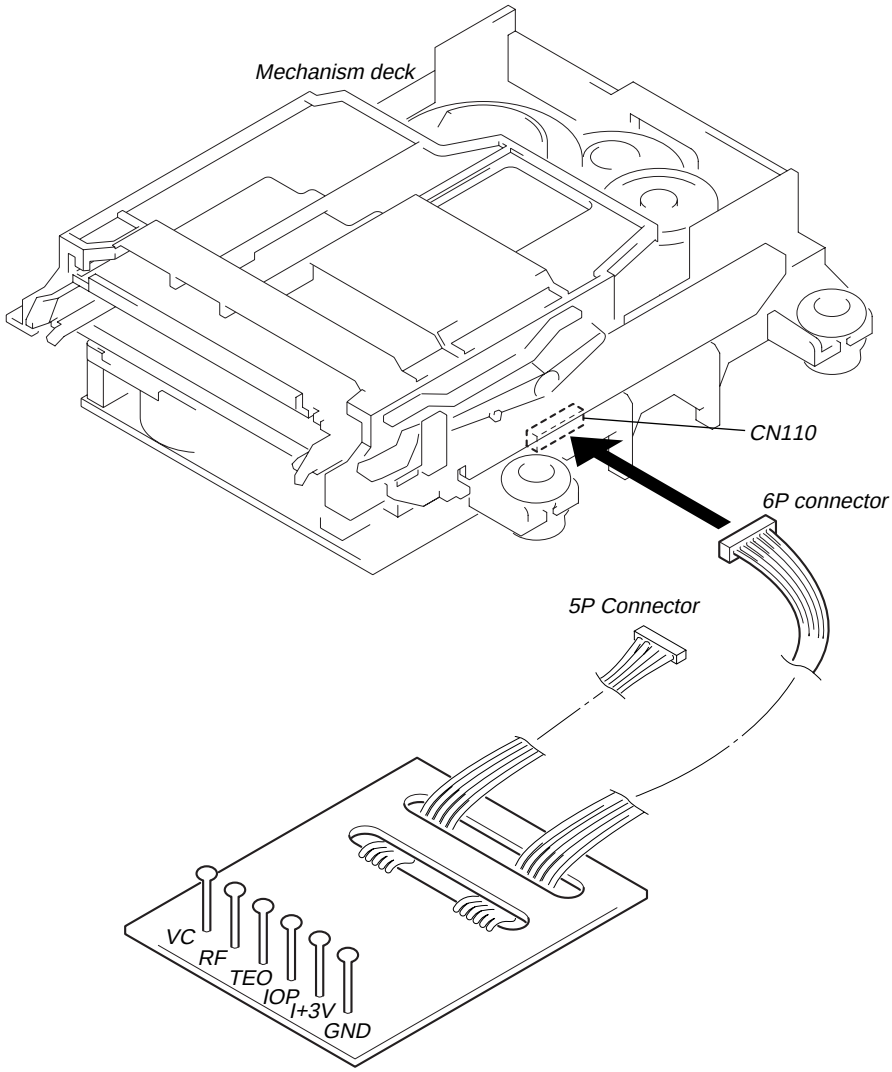
**8. ELECTRICAL PARTS LIST** ..... 65

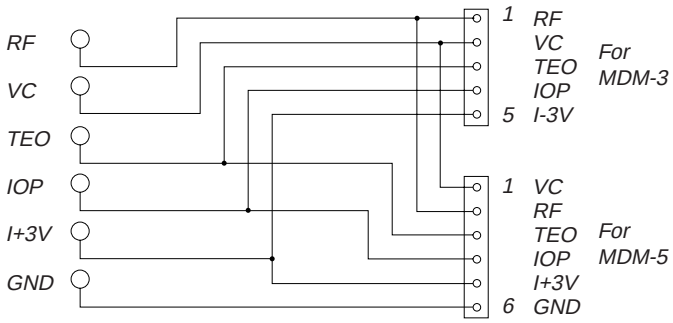
# SECTION 1
# SERVICING NOTE

## JIG FOR CHECKING BD BOARD WAVEFORM

The special jig (J-2501-149-A) is useful for checking the waveform of the BD board. The names of terminals and the checking items to be performed are shown as follows.

GND : Ground
I+3V : For measuring IOP (Check the deterioration of the optical pick-up laser)
IOP : For measuring IOP (Check the deterioration of the optical pick-up laser)
TEO : TRK error signal (Traverse adjustment)
VC : Reference level for checking the signal
RF : RF signal (Check jitter)



## IOP DATA RECORDING AND DISPLAY WHEN OPTICAL PICK-UP AND NON-VOLATILE MEMORY (IC171 OF BD BOARD) ARE REPLACED

The IOP value labeled on the optical pick-up can be recorded in the non-volatile memory. By recording the value, it will eliminate the need to look at the value on the label of the optical pick-up. When replacing the optical pick-up or non-volatile memory (IC171 of BD board), record the IOP value on the optical pick-up according to the following procedure.

**Record Precedure:**

1. While pressing the AMS knob and ■ button, connect the power plug to the outlet, and release the AMS knob and ■ button.
2. Rotate the AMS knob to display "[Service]", and press the YES button.
3. Rotate the AMS knob to display "lop.Write", and press the YES button.
4. The display becomes "Ref=@@@.@" (@ is an arbitrary number) and the numbers which can be changed will blink.
5. Input the IOP value written on the optical pick-up.
   To select the number : Rotate the AMS knob.
   To select the digit : Press the AMS knob.
6. When the YES button is pressed, the display becomes "Measu=@@@.@" (@ is an arbitrary number).
7. As the adjustment results are recorded for the 6 value. Leave it as it is and press the YES button.
8. "Complete!" will be displayed momentarily. The value will be recorded in the non-volatile memory and the display will become "Iop Write".
9. Press the REPEAT button to complete.

**Display Precedure:**

1. While pressing the AMS knob and ■ button, connect the power plug to the outlet, and release the AMS knob and ■ button.
2. Rotate the AMS knob to display "[Service]", and press the YES button.
3. Rotate the AMS knob to display "lop.Read".
4. "@@.@/##.#" is displayed and the recorded contents are displayed.
   @@.@ : indicates the Iop value labeled on the pick-up.
   ##.# : indicates the Iop value after adjustment
5. To end, press the AMS button or MENU/NO button to display "Iop Read". Then press the REPEAT button.

## CHECKS PRIOR TO PARTS REPLACEMENT AND ADJUSTMENTS

Before performing repairs, perform the following checks to determine the faulty locations up to a certain extent.
Details of the procedures are described in "5 Electrical Adjustments".

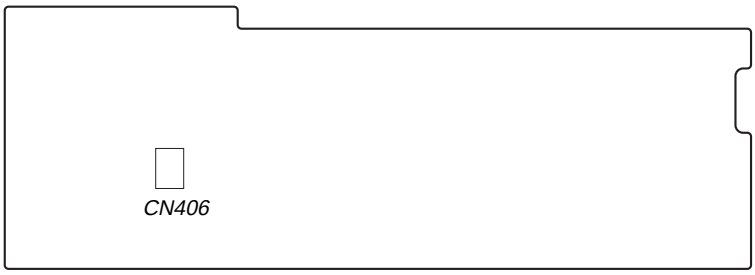
| | Criteria for Determination<br>(Unsatisfactory if specified value is not satisfied) | Measure if unsatisfactory: |
|---|---|---|
| Laser power check<br>(5-6-2 : See page 21) | • 0.9 mW power<br>Specified value : 0.84 to 0.92 mW<br>• 7.0 mW power<br>Specified value : 6.8 to 7.2 mW | • Clean the optical pick-up<br>• Adjust again<br>• Replace the optical pick-up |
| | lop (at 7mW)<br>• Labeled on the optical pickup<br>Iop value ± 10mA | • Replace the optical pick-up |
| Traverse check<br>(5-6-3 : See page 21) | • Traverse waveform<br>Specified value : Below 10% offset | • Replace the optical pick-up |
| Focus bias check<br>(5-6-4 : See page 22) | • Error rate check<br>Specified value : For points a, b, and c<br>C1 error : Below 220<br>AD error : Below 2 | • Replace the optical pick-up |
| C PLAY check<br>(5-6-5 : See page 22) | • Error rate check<br>Specified value:<br>a. When using test disc (MDW-74/AU-1)<br>C1 error : Below 80<br>AD error : Below 2<br>b. When using check disc (TDYS-1)<br>C1 error : Below 50 | • Replace the optical pick-up |
| Self-recording/playback check<br>(REC/PLAY)<br>(5-6-6 : See page 22) | • CPLAY error rate check<br>Specified value:<br>C1 error : Below 80<br>AD error : Below 2 | If always unsatisfactory:<br>• Replace the overwrite head<br>• Check for disconnection of the circuits around the overwrite head |
| | | If occasionally unsatisfactory:<br>• Check if the overwrite head is distorted<br>• Check the mechanism around the sled |
| TEMP check<br>(Temperature compensation offset check)<br>(5-6-1 : See page 21) | • Unsatisfactory if displayed as T=@@ (##) [NG]" NG<br>(@@, ## are both arbitrary numbers) | • Check for disconnection of the circuits around D101 (BD board)<br>• Check the signals around IC101, IC121, CN102, CN103 (BD board) |

**Note:**
The criteria for determination above is intended merely to determine if satisfactory or not, and does not serve as the specified value for adjustments.
When performing adjustments, use the specified values for adjustments.

## FORCED RESET

The system microprocessor can be reset in the following procedure.
Use these procedure when the unit cannot be operated normally due to the overrunning of the microprocessor, etc.
**Procedure :**
Remove the short-pin attached to CN406, and then attach it again.

**[MAIN BOARD] (Component Side)**



## RETRY CAUSE DISPLAY MODE

- In this test mode, the causes for retry of the unit during recording can be displayed on the fluorescent indicator tube. During playback, the "track mode" for obtaining track information will be set.
  This is useful for locating the faulty part of the unit.
- The following will be displayed :
  During recording and stop : Retry cause, number of retries, and number of retry errors.
  During playback : Information such as type of disc played, part played, copyright.
  These are displayed in hexadecimal.

**Procedure:**

1. Procedure 1: Press the [■] button continuously for about 10 seconds.
   Procedure 2: Press the [LEVEL/DISPLAY/CHAR] button while pressing the [■] button and [MENU/NO] button.
2. When the mode is set, "RTs 00c 00e 00" is displayed.
3. Press the [● REC] button to start recording. Then press the [❚❚] button and start recording.
4. To check the "track mode", press the [▷] button to start play.
5. To exit the test mode, press the [I/⏻] button, and turn OFF the power. When "TOC" disappears, disconnect the power plug from the outlet.
   If the test mode cannot be exited, refer to "Forced Reset" on page 8.

***Fig. 1 Reading the Test Mode Display (During recording and stop)***

[RTs@@c##c**]
Fluorescent display tube display

@@ : Cause of retry
## : Number of retries
** : Number of retry errors

***Fig. 2 Reading the Test Mode Display (During playback)***

[@@####**$$]
Fluorescent display tube display

@@ : Parts No. (name of area named on TOC)
## : Cluster
** : Sector } Address (Physical address on disc)
$$ : Track mode (Track information such as copyright information of each part)

Reading the Retry Cause Display

| | Higher Bits | | | | Lower Bits | | | | Hexa-decimal | Cause of Retry | Occurring conditions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hexadecimal | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | | | |
| Bit | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 | | | |
| Binary | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 01 | shock | When track jump (shock) is detected |
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 02 | ader5 | When ADER was counted more than five times continuously |
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 04 | Discontinuous address | When ADIP address is not continuous |
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 08 | DIN unlock | When DIN unlock is detected |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 10 | FCS incorrect | When not in focus |
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | IVR rec error | When ABCD signal level exceeds the specified range |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | CLV unlock | When CLV is unlocked |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | Access fault | When access operation is not performed normally |

**Reading the Display:**
Convert the hexadecimal display into binary display. If more than two causes, they will be added.

**Example**
When 42 is displayed:
Higher bit : 4 = 0100 ⟶ b6
Lower bit : 2 = 0010 ⟶ b1
In this case, the retry cause is combined of "CLV unlock" and "ader5".

When A2 is displayed:
Higher bit : A = 1010 ⟶ b7+b5
Lower bit : 2 = 0010 ⟶ b2
The retry cause in this case is combined of "access fault", "IVR rec error", and "ader5".

Reading the Track Mode Display

| | Higher Bits | | | | Lower Bits | | | | Hexa-decimal | Details | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hexadecimal | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | | | |
| Bit | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 | | When 0 | When 1 |
| Binary | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 01 | Emphasis OFF | Emphasis ON |
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 02 | Monaural | Stereo |
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 04 | This is 2-bit display. Normally 01. | |
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 08 | 01:Normal audio. Others:Invalid | |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 10 | Audio (Normal) | Invalid |
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | Original | Digital copy |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | Copyright | No copyright |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | Write prohibited | Write allowed |

**Reading the Display:**
Convert the hexadecimal display into binary display. If more than two causes, they will be added.

Example When 84 is displayed:
Higher bit : 8 = 1000 ⟶ b7
Lower bit : 4 = 0100 ⟶ b2
In this case, as b2 and b7 are 1 and others are 0, it can be determined that the retry cause is combined of “emphasis OFF”, “monaural”, “original”, “copyright exists”, and “write allowed”.

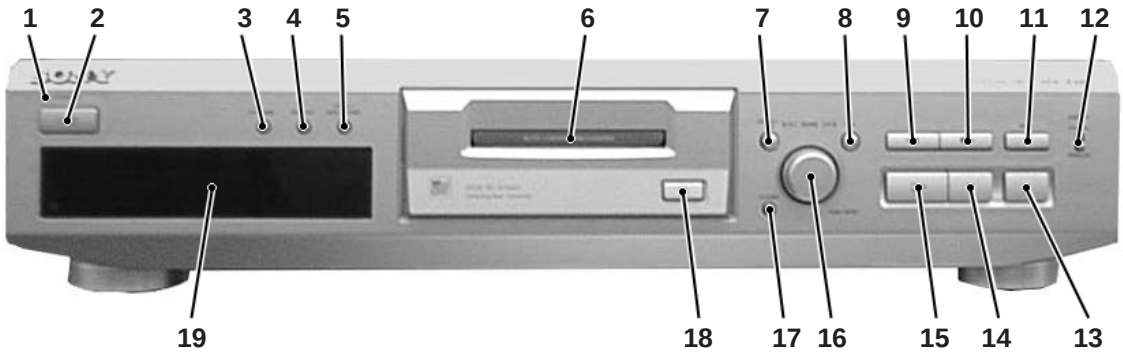
Example When 07 is displayed:
Higher bit : 0 = 1000 ⟶ All 0
Lower bit : 7 = 0111 ⟶ b0+b1+b2
In this case, as b0, b1, and b2 are 1 and others are 0, it can be determined that the retry cause is combined of “emphasis ON”, “stereo”, “original”, “copyright exists”, and “write prohibited”.

***Hexadecimal ⟶ Binary Conversion Table***

| Hexadecimal | Binary | Hexadecimal | Binary |
|---|---|---|---|
| 0 | 0000 | 8 | 1000 |
| 1 | 0001 | 9 | 1001 |
| 2 | 0010 | A | 1010 |
| 3 | 0011 | B | 1011 |
| 4 | 0100 | C | 1100 |
| 5 | 0101 | D | 1101 |
| 6 | 0110 | E | 1110 |
| 7 | 0111 | F | 1111 |

# SECTION 2
# GENERAL

**Front Panel**




## LOCATION OF PARTS AND CONTROLS

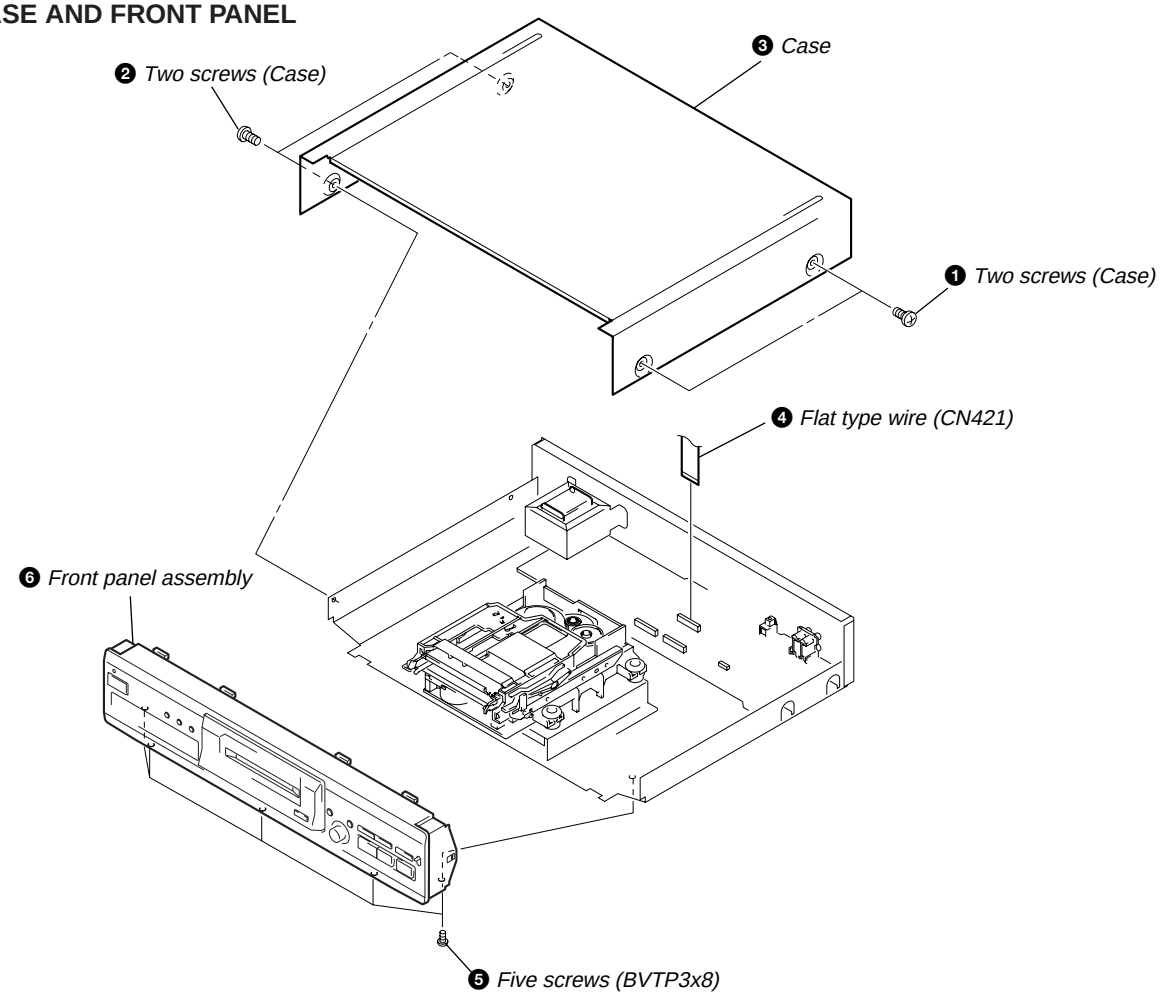
**1** STANDBY indicator
**2** I/⏻ (Power) button
**3** PLAY MODE button
**4** REPEAT button
**5** LEVEL/DISPLAY/CHAR button
**6** DISK compartment
**7** MENU/NO button
**8** YES button
**9** ◀◀ button
**10** ▶▶ button
**11** ● REC (Recording) button
**12** INPUT DIGITAL/ANALOG switch
**13** ■ (stop) button
**14** ❚❚ (Pause) button
**15** ▷ (Play) button
**16** ⏮ AMS ⏭ PUSH ENTOR knob
**17** CLEAR button
**18** ⏏ (Eject) button
**19** DISPLAY window

• AMS is the abbreviation for Automatic Music Sensor.

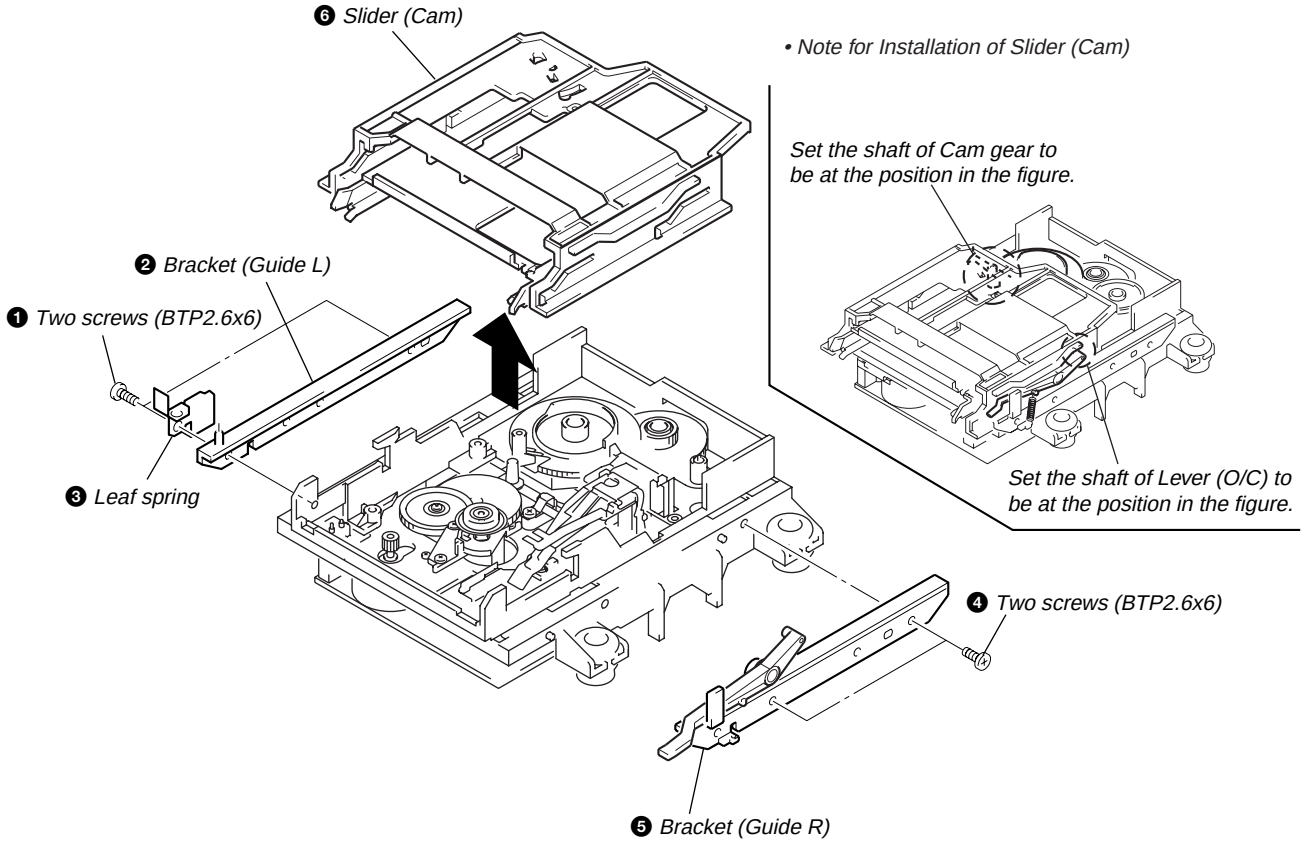
# SECTION 3
# DISASSEMBLY

**Note:** Follow the disassembly procedure in the numerical order given.

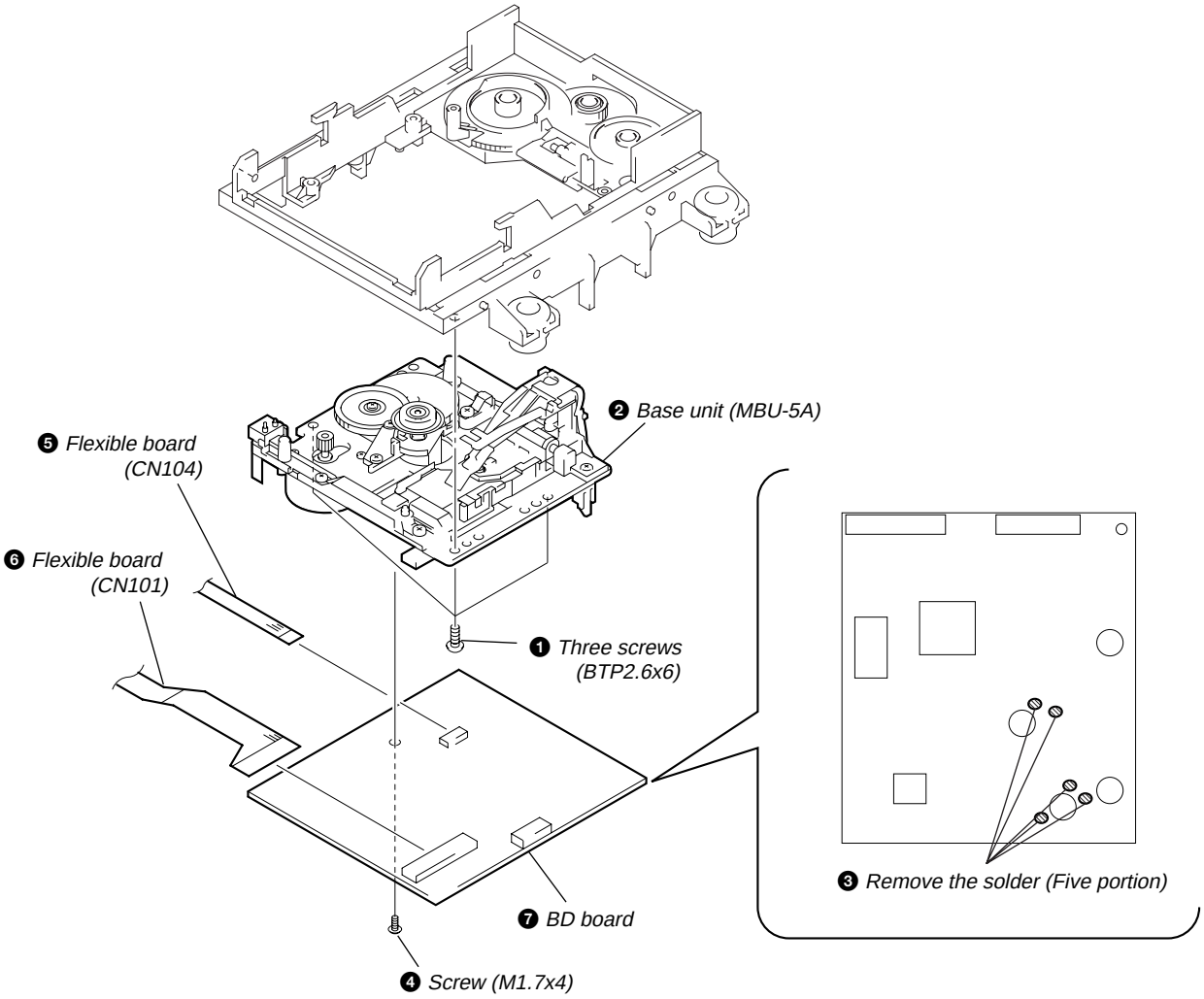
## 3-1. CASE AND FRONT PANEL



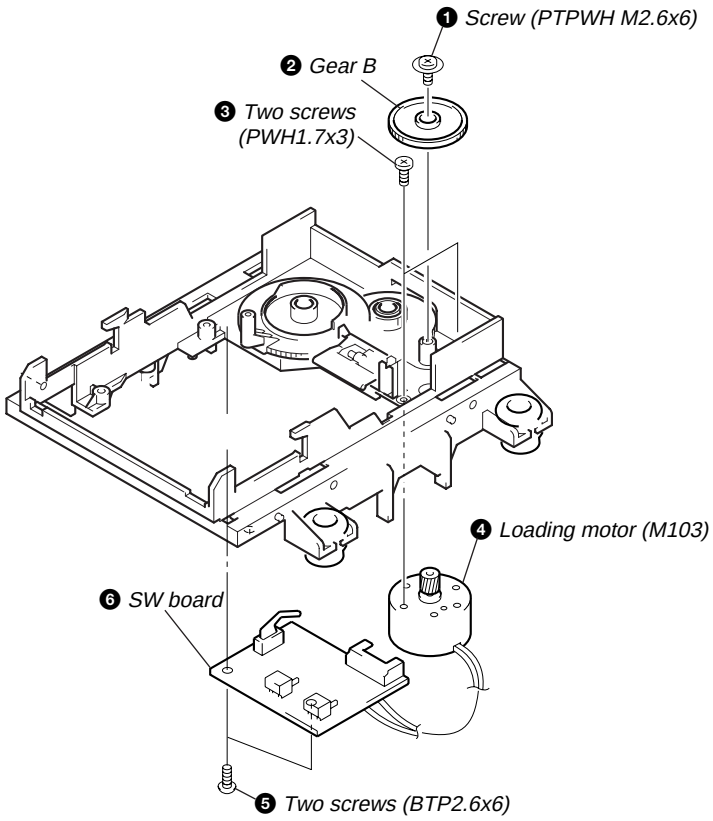

## 3-2. SLIDER (CAM)


❻ Slider (Cam)
• Note for Installation of Slider (Cam)
Set the shaft of Cam gear to be at the position in the figure.
❷ Bracket (Guide L)
❶ Two screws (BTP2.6x6)
❸ Leaf spring
Set the shaft of Lever (O/C) to be at the position in the figure.
❹ Two screws (BTP2.6x6)
❺ Bracket (Guide R)

### 3-3. BASE UNIT (MBU-5A) AND BD BOARD


❷ Base unit (MBU-5A)
❺ Flexible board (CN104)
❻ Flexible board (CN101)
❶ Three screws (BTP2.6x6)
❸ Remove the solder (Five portion)
❼ BD board
❹ Screw (M1.7x4)

### 3-4. SW BOARD AND LOADING MOTOR (M103)



# SECTION 4
# TEST MODE

## 4-1. PRECAUTIONS FOR USE OF TEST MODE

- As loading related operations will be performed regardless of the test mode operations being performed, be sure to check that the disc is stopped before setting and removing it.
  Even if the ⏏EJECT button is pressed while the disc is rotating during continuous playback, continuous recording, etc., the disc will not stop rotating.
  Therefore, it will be ejected while rotating.
  Be sure to press the ⏏EJECT button after pressing the MENU/NO button and the rotation of disc is stopped.

### 4-1-1. Recording laser emission mode and operating buttons

- Continuous recording mode (CREC MODE)
- Laser power check mode (LDPWR CHECK)
- Laser power adjustment mode (LDPWR ADJUST)
- Traverse (MO) check (EF MO CHECK)
- Traverse (MO) adjustment (EF MO ADJUST)
- When pressing the ●REC button.

## 4-2. SETTING THE TEST MODE

The following are two methods of entering the test mode.

**Procedure 1:** While pressing the AMS knob and ■ button, connect the power plug to an outlet, and release the AMS knob and ■ button.
When the test mode is set, "[Check]" will be displayed. Rotating the AMS knob switches between the following four groups;
⋯ ⟷ Check ⟷ Adjust ⟷ Service ⟷ Develop ⟷ ⋯.

**Procedure 2:** While pressing the AMS knob, connect the power plug to the outlet and release the AMS knob.
When the test mode is set, "TEMP CHECK" will be displayed. By setting the test mode using this method, only the "Check" group of method 1 can be executed.

## 4-3. EXITING THE TEST MODE

Press the REPEAT button. The disc is ejected when loaded, and "Standby" display blinks, and the STANDBY state is set.

## 4-4. BASIC OPERATIONS OF THE TEST MODE

All operations are performed using the AMS knob, YES button, and MENU/NO button.
The functions of these buttons are as follows.

| Function name | Function |
|---|---|
| AMS knob | Changes parameters and modes |
| YES button | Proceeds onto the next step. Finalizes input. |
| MENU/NO button | Returns to previous step. Stops operations. |

## 4-5. SELECTING THE TEST MODE

There are 24 types of test modes as shown below. The groups can be switched by rotating the AMS knob. After selecting the group to be used, press the YES button. After setting a certain group, rotating the AMS knob switches between these modes.
Refer to “Group” in the table for details selected.
All items used for servicing can be treated using group S. So be carefully not to enter other groups by mistake.

| Display | Contents | Mark | Group (∗) |
|---|---|---|---|
| TEMP CHECK | Temperature compensation offset check | | C S |
| LDPWR CHECK | Laser power check | | C S |
| EF MO CHECK | Traverse (MO) check | | C S |
| EF CD CHECK | Traverse (CD) check | | C S |
| FBIAS CHECK | Focus bias check | | C S |
| S curve CHECK | S letter check | (X) | C |
| VERIFY MODE | Non-volatile memory check | (X) | C |
| DETRK CHECK | Detrack check | (X) | C |
| TEMP ADJUST | Temperature compensation offset adjustment | | A S |
| LDPWR ADJUST | Laser power adjustment | | A S |
| EF MO ADJUST | Traverse (MO) adjustment | | A S |
| EF CD ADJUST | Traverse (CD) adjustment | | A S |
| FBIAS ADJUST | Focus bias adjustment | | A S |
| EEP MODE | Non-volatile memory control | (X) (!) | D |
| Impossible | No function | (X) | D |
| ERR DP MODE | Error history display, clear | | S |
| ADJ CLEAR | Initialization of non-volatile memory of adjustment value | | A S |
| AG Set (MO) | Auto gain output level adjustment (MO) | | A S |
| AG Set (CD) | Auto gain output level adjustment (CD) | | A S |
| Iop Read | IOP data display | | C S |
| Iop Write | IOP data write | | A S |
| S40 @@.@@ | Microprocessing version display | | C S |
| CPLAY MODE | Continuous play mode | | C A S D |
| CREC MODE | Continuous recording mode | | C A S D |

Group (∗)
C: Check A: Adjust
S: Service D: Develop

- For details of each adjustment mode, refer to “5. Electrical Adjustments”.
  For details of “ERR DP MODE”, refer to “Self-Diagnosis Function” on page 2.
- If a different mode has been selected by mistake, press the MENU/NO button to exit that mode.
- Modes with (X) in the Mark column are not used for servicing and therefore are not described in detail. If these modes are set accidentally, press the MENU/NO button to exit the mode immediately. Be especially careful not to set the modes with (!) as they will overwrite the non-volatile memory and reset it, and as a result, the unit will not operate normally.

### 4-5-1. Operating the Continuous Playback Mode

1. Entering the continuous playback mode
   ① Set the disc in the unit. (Whichever recordable discs or discs for playback only are available.)
   ② Rotate the [AMS] knob and display "CPLAY MODE".
   ③ Press the [YES] button to change the display to "CPLAY MID".
   ④ When access completes, the display changes to "C = □□□□ AD = □□".
   **Note :** The numbers "□" displayed show you error rates and ADER.
2. Changing the parts to be played back
   ① Press the [YES] button during continuous playback to change the display as below.
   "CPLAY MID" → "CPLAY OUT" → "CPLAY IN" →
   When pressed another time, the parts to be played back can be moved.
   ② When access completes, the display changes to "C = □□□□ AD = □□".
   **Note :** The numbers "□" displayed show you error rates and ADER.
3. Ending the continuous playback mode
   ① Press the [MENU/NO] button. The display will change to "CPLAY MODE".
   ② Press the [⏏EJECT] button to remove the disc.
   **Note :** The playback start addresses for IN, MID, and OUT are as follows.
   IN 40h cluster
   MID 300h cluster
   OUT 700h cluster

### 4-5-2. Operating the Continuous Recording Mode (Use only when performing self-recording/palyback check.)

1. Entering the continuous recording mode
   ① Set a recordable disc in the unit.
   ② Rotate the [AMS] knob and display "CREC MODE".
   ③ Press the [YES] button to change the display to "CREC MID".
   ④ When access completes, the display changes to "CREC (□□□□)" and **REC** lights up.
   **Note :** The numbers "□" displayed shows you the recording position addresses.
2. Changing the parts to be recorded
   ① When the [YES] button is pressed during continuous recording, the display changes as below.
   "CPLAY MID" → "CPLAY OUT" → "CPLAY IN" →
   When pressed another time, the parts to be recorded can be changed. **REC** goes off.
   ② When access completes, the display changes to "CREC (□□□□)" and **REC** lights up.
   **Note :** The numbers "□" displayed shows you the recording position addresses.
3. Ending the continuous recording mode
   ① Press the [MENU/NO] button. The display changes to "CREC MODE" and **REC** goes off.
   ② Press the [⏏] button to remove the disc.
   **Note 1 :** The recording start addresses for IN, MID, and OUT are as follows.
   IN 40h cluster
   MID 300h cluster
   OUT 700h cluster
   **Note 2 :** The [MENU/NO] button can be used to stop recording anytime.
   **Note 3 :** Do not perform continuous recording for long periods of time above 5 minutes.
   **Note 4 :** During continuous recording, be careful not to apply vibration.

### 4-5-3. Non-Volatile Memory Mode (EEP MODE)

This mode reads and writes the contents of the non-volatile memory.
It is not used in servicing. If set accidentally, press the [MENU/NO] button immediately to exit it.

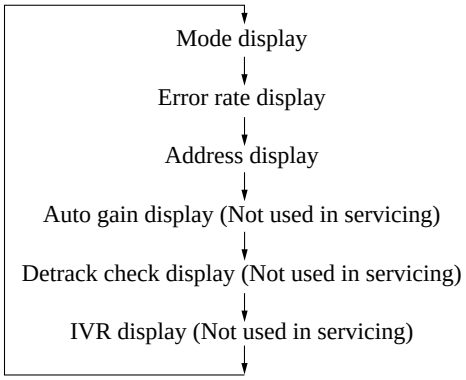
## 4-6. FUNCTIONS OF OTHER BUTTONS

| Function | Contents |
|---|---|
| ▷ | Sets continuous playback when pressed in the STOP state. When pressed during continuous playback, the tracking servo turns ON/OFF. |
| ■ | Stops continuous playback and continuous recording. |
| ►► | The sled moves to the outer circumference only when this is pressed. |
| ◄◄ | The sled moves to the inner circumference only when this is pressed. |
| PLAY MODE → LEVEL/DISPLAY/CHAR (∗) | Switches between the pit and groove modes when pressed. |
| PLAY MODE → PLAY MODE (∗) | Switches the spindle servo mode (CLV S ↔ CLV A). |
| LEVEL/DISPLAY/CHAR | Switches the displayed contents each time the button is pressed |
| ⏏ | Ejects the disc |
| REPEAT | Exits the test mode |

(∗)When displayed as "PLAY MODE→PLAY MODE", it means to press the PLAY MODE button, and then press it again. When pressed the first time, the fluorescent display tube displays "PROGRAM".

## 4-7. TEST MODE DISPLAYS

Each time the LEVEL/DISPLAY/CHAR button is pressed, the display changes in the following order.


Mode display
Error rate display
Address display
Auto gain display (Not used in servicing)
Detrack check display (Not used in servicing)
IVR display (Not used in servicing)

### 1. Mode display

Displays "TEMP ADJUST", "CPLAYMODE", etc.

### 2. Error rate display

Displays the error rate in the following way.

C1 = □□□□ AD = □□

C1 = Indicates the C1 error.

AD = Indicates ADER.

### 3. Address display

The address is displayed as follows. (MO:recordable disc, CD:playback only disc)
If the LEVEL/DISPLAY/CHAR button is pressed after pressing the PROGRAM button, the display switches from groove to pit or vice versa.

h = □□□□ s = □□□□ (MO pit and CD)
h = □□□□ a = □□□□ (MO groove)
h = Indicates the header address.
s = Indicates the SUBQ address.
a = Indicates the ADIP address.

**Note:** "–" is displayed when servo is not imposed.

### 4. Auto gain display (Not used in servicing)

The auto gain is displayed as follows.
AG = □□ / □□ [□□]

### 5. Detrack check display (Not used in servicing)

The detrack is displayed as follows.
ADR = □□□□□□□

### 6. IVR display (Not used in servicing)

The IVR is displayed as follows.
[□□][□□][□□

## MEANINGS OF OTHER DISPLAYS

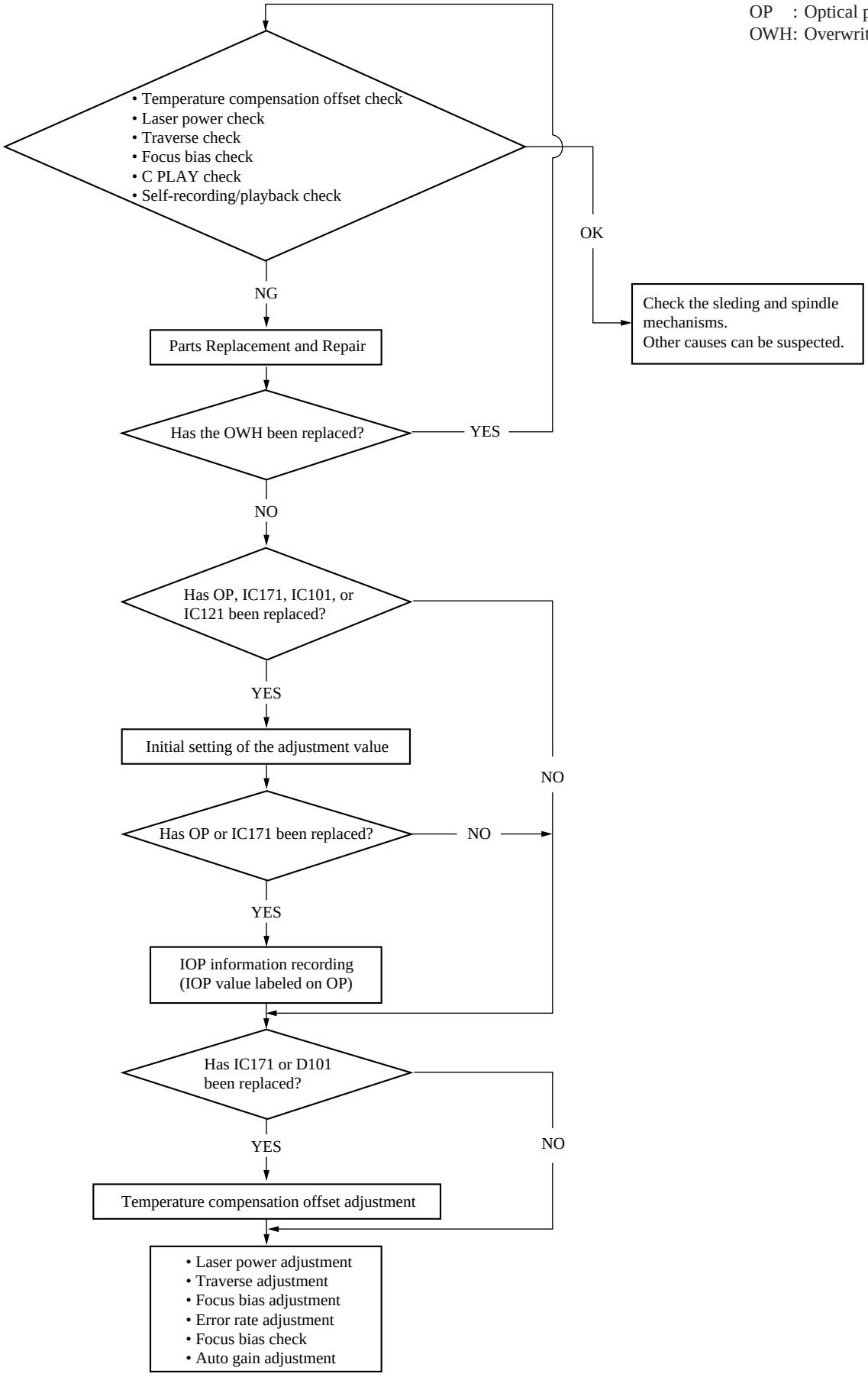
| Display | Contents | |
|---|---|---|
| | When Lit | When Off |
| ▷ | During continuous playback (CLV: ON) | STOP (CLV: OFF) |
| ▮▮ | Tracking servo OFF | Tracking servo ON |
| REC | Recording mode ON | Recording mode OFF |
| SYNC | CLV low speed mode | CLV normal mode |
| L.SYNC | ABCD adjustment completed | |
| OVER | Tracking offset cancel ON | Tracking offset cancel OFF |
| B | Tracking auto gain OK | |
| A- | Focus auto gain OK | |
| TRACK | Pit | Groove |
| DISC | High reflection | Low reflection |
| SLEEP | CLV S | CLV A |
| MONO | CLV LOCK | CLV UNLOCK |
| PROGRAM | When the PLAY MODE button is pressed | |

# SECTION 5
# ELECTRICAL ADJUSTMENTS

## 5-1. PARTS REPLACEMENT AND ADJUSTMENT

• Check and adjust the MDM and MBU as follows.
The procedure changes according to the part replaced

• Abbreviation
OP : Optical pick-up
OWH: Overwrite head

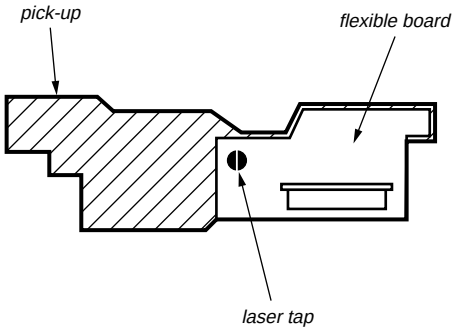


## 5-2. PRECAUTIONS FOR CHECKING LASER DIODE EMISSINON

To check the emission of the laser diode during adjustments, never view directly from the top as this may lose your eye-sight.

## 5-3. PRECAUTIONS FOR USE OF OPTICAL PICK-UP (KMS-260A)

As the laser diode in the optical pick-up is easily damaged by static electricity, solder the laser tap of the flexible board when using it. Before disconnecting the connector, desolder first. Before connecting the connector, be careful not to remove the solder. Also take adequate measures to prevent damage by static electricity. Handle the flexible board with care as it breaks easily.




***Optical pick-up flexible board***

## 5-4. PRECAUTIONS FOR ADJUSTMENTS

1) When replacing the following parts, perform the adjustments and checks with **O** in the order shown in the following table.

| | Optical Pick-up | BD Board | | | |
|---|---|---|---|---|---|
| | | IC171 | D101 | IC101, IC121 | IC192 |
| 1. Initial setting of adjustment value | O | O | × | O | × |
| 2. Recording of IOP information (Value written in the pick-up) | O | O | × | × | × |
| 3. Temperature compensation offset adjustment | × | O | O | × | × |
| 4. Laser power adjustment | O | O | × | O | O |
| 5. Traverse adjustment | O | O | × | O | × |
| 6. Focus bias adjustment | O | O | × | O | × |
| 7. Error rate check | O | O | × | O | × |
| 8. Auto gain output level adjustment | O | O | × | O | × |

2) Set the test mode when performing adjustments.
   After completing the adjustments, exit the test mode.
   Perform the adjustments and checks in "group S" of the test mode.
3) Perform the adjustments to be needed in the order shown.
4) Use the following tools and measuring devices.
   - Check Disc (MD) TDYS-1
     (Parts No. 4-963-646-01)
   - Test Disk (MDW-74/AU-1) (Parts No. 8-892-341-41)
   - Laser power meter LPM-8001 (Parts No. J-2501-046-A)

   or
     MD Laser power meter 8010S (Parts No. J-2501-145-A)
   - Oscilloscope (Measure after performing CAL of prove.)
   - Digital voltmeter
   - Thermometer
   - Jig for checking BD board waveform
     (Parts No. : J-2501-149-A)
5) When observing several signals on the oscilloscope, etc., make sure that VC and ground do not connect inside the oscilloscope.
   (VC and ground will become short-circuited.)
6) Using the above jig enables the waveform to be checked without the need to solder.
   (Refer to Servicing Note on page 6.)
7) As the disc used will affect the adjustment results, make sure that no dusts nor fingerprints are attached to it.

## 5-5. CREATING CONTINUOUSLY RECORDED DISC

* This disc is used in focus bias adjustment and error rate check.
The following describes how to create a continuous recording disc.

1. Insert a disc (blank disc) commercially available.
2. Rotate the AMS knob and display "CREC MODE".
3. Press the YES button again to display "CREC MID".
   Display "CREC (0300)" and start to recording.
4. Complete recording within 5 minutes.
5. Press the MENU/NO button and stop recording .
6. Press the ⏏EJECT button and remove the disc.

The above has been how to create a continuous recorded data for the focus bias adjustment and error rate check.

**Note :**

- Be careful not to apply vibration during continuous recording.

## 5-6. CHECKS PRIOR TO REPAIRS

These checks are performed before replacing parts according to "approximate specifications" to determine the faulty locations. For details, refer to "Checks Prior to Parts Replacement and Adjustments" (See page 8).

### 5-6-1. Temperature Compensation Offset Check

When performing adjustments, set the internal temperature and room temperature to 22 to 28ºC.

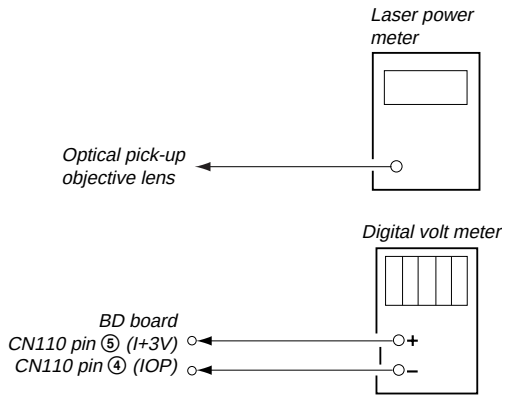
**Checking Procedure:**

1. Rotate the AMS knob to display "TEMP CHECK".
2. Press the YES button.
3. "T=@@(##) [OK]" should be displayed. If "T=@@ (##) [NG]" is displayed, it means that the results are bad.
   (@@ indicates the current value set, and ## indicates the value written in the non-volatile memory.)

### 5-6-2. Laser Power Check

Before checking, check the IOP value of the optical pick-up. (Refer to 5-8. Recording and Displaying IOP Information.)

**Connection :**




**Checking Procedure:**

1. Set the laser power meter on the objective lens of the optical pick-up. (When it cannot be set properly, press the ◀◀ button or ▶▶ button to move the optical pick-up.)
   Connect the digital volt meter to CN110 pin ⑤ (I+3V) and CN110 pin ④ (IOP).
2. Then, rotate the AMS knob and display "LDPWR CHECK".
3. Press the YES button once and display " 0.9 mW ✱✱✱ $ ⬚". Check that the reading of the laser power meter become 0.84 to 0.92 mW. (✱✱✱ means IOP value)
4. Press the YES button once more and display " 7.0 mW ✱✱✱ $ ⬚". Check that the reading the laser power meter and digital volt meter satisfy the specified value.

**Specified Value :**

Laser power meter reading : 7.0 ± 0.2 mW
Digital voltmeter reading : Optical pick-up displayed value ± 10%

(Optical pick-up label)

KMS260A
27X40
B0825

*(For details of the method for checking this value, refer to "5-8. Recording and Displaying IOP Information".)*

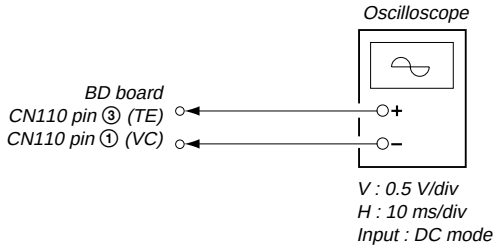
*Iop = 82.5 mA in this case*
*Iop (mA) = Digital voltmeter reading (mV)/1 (Ω)*

5. Press the MENU/NO button and display "LDPWR CHECK" and stop the laser emission.
   (The MENU/NO button is effective at all times to stop the laser emission.)

**Note 1:** After step 4, each time the YES button is pressed, the display will be switched between " 0.7 mW ✱✱✱ $ ⬚", " 6.2 mW ✱✱✱ $ ⬚", and " Wp ホセイ ✱✱✱ $ ⬚". Nothing needs to be performed here.

### 5-6-3. Traverse Check

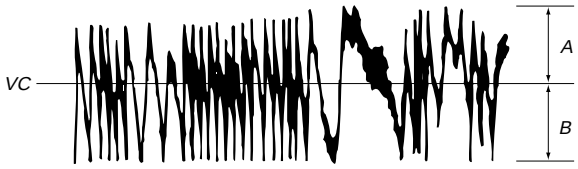
**Connection :**




**Checking Procedure:**

1. Connect an oscilloscope to CN110 pin ③ (TE) and CN110 pin ① (VC) of the BD board.
2. Load a disc (any available on the market). (Refer to Note 1.)
3. Press the ▶▶ button and move the optical pick-up outside the pit.
4. Rotate the AMS knob and display "EF MO CHECK".
5. Press the YES button and display "EFB = ⬚ MO-R".
   (Laser power READ power/Focus servo ON/tracking servo OFF/ spindle (S) servo ON)
6. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the AMS knob.
   (Read power traverse checking)

(Traverse Waveform)

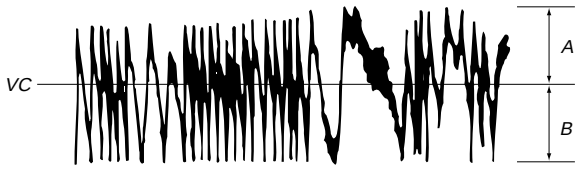



*Specified value : Below 10% offset value*

$$\text{Offset value (\%)} = \frac{|A - B|}{2\,(A + B)} \times 100$$

7. Press the YES button and display "EFB = ⬚ MO-W".
8. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the AMS knob.
   (Write power traverse checking)

(Traverse Waveform)



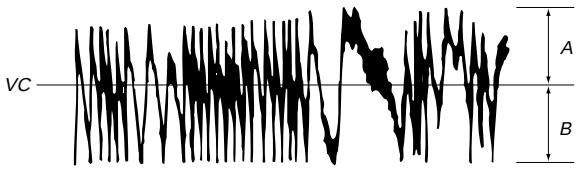

*Specified value : Below 10% offset value*

$$\text{Offset value (\%)} = \frac{|A - B|}{2\,(A + B)} \times 100$$

9. Press the YES button display "EFB = ⬚ MO-P".
   Then, the optical pick-up moves to the pit area automatically and servo is imposed.

10. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the AMS knob.

(Traverse Waveform)

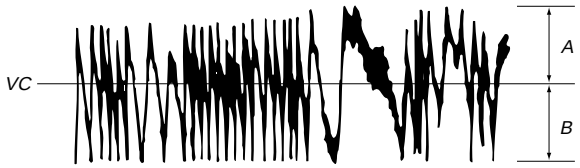



*Specified value : Below 10% offset value*

$$\text{Offset value (\%)} = \frac{|A - B|}{2\,(A + B)} \times 100$$

11. Press the YES button display “EF MO CHECK”
    The disc stops rotating automatically.
12. Press the ⏏ button and remove the disc.
13. Load the check disc (MD) TDYS-1.
14. Roteto the AMS knob and display “EF CD CHECK” (C04).
15. Press the YES button and display “EFB = □ CD”. Servo is imposed automatically.
16. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the AMS knob.

(Traverse Waveform)



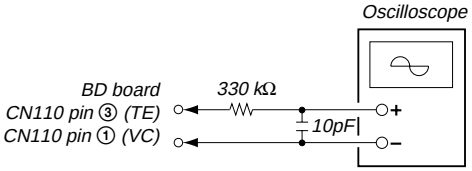

*Specified value : Below 10% offset value*

$$\text{Offset value (\%)} = \frac{|A - B|}{2\,(A + B)} \times 100$$

17. Press the YES button and display “EF CD CHECK”.
18. Press the ⏏ button and remove the check disc (MD) TDYS-1.

**Note 1 :** MO reading data will be erased during if a recorded disc is used in this adjustment.

**Note 2 :** If the traverse waveform is not clear, connect the oscilloscope as shown in the following figure so that it can be seen more clearly.




### 5-6-4. Focus Bias Check

Change the focus bias and check the focus tolerance amount.

**Checking Procedure :**

1. Load a test disk (MDW-74/AU-1).
2. Rotate the AMS knob and display “CPLAY MODE”.
3. Press the YES button twice and display “CPLAY MID”.
4. Press the MENU/NO button when “C = □□□□ AD = □□” is displayed.
5. Rotate the AMS knob and display “FBIAS CHECK”.
6. Press the YES button and display “ □□□□/□□ c = □□”.
   The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [c =] indicate the focus bias value.
   Check that the C1 error is below 220 and ADER is below 2.
7. Press the YES button and display “ □□□□/□□ b = □□”.
   Check that the C1 error is below 220 and ADER is below 2.
8. Press the YES button and display “ □□□□/□□ a = □□”.
   Check that the C1 error is below 220 and ADER is below 2.
9. Press the MENU/NO button, next press the ⏏ button, and remove the test disc.

### 5-6-5. C PLAY Checking

#### MO Error Rate Check

**Checking Procedure :**

1. Load a test disk (MDW-74/AU-1).
2. Rotate the AMS knob and display “CPLAY MODE”.
3. Press the YES button and display “CPLAY MID”.
4. The display changes to “C1 = □□□□ AD = □□”.
5. If the C1 error rate is below 80, check that ADER is below 2.
6. Press the MENU/NO button, stop playback, press the ⏏ button, and test disc.

#### CD Error Rate Check

**Checking Procedure :**

1. Load a check disc (MD) TDYS-1.
2. Rotate the AMS knob and display “CPLAY MODE”.
3. Press the YES button twice and display “CPLAY MID”.
4. The display changes to “C1 = □□□□ AD = □□”.
5. Check that the C1 error rate is below 50.
6. Press the MENU/NO button, stop playback, press the ⏏ button, and the test disc.

### 5-6-6. Self-Recording/playback Check

Prepare a continuous recording disc using the unit to be repaired and check the error rate.

**Checking Procedure :**

1. Insert a recordable disc (blank disc) into the unit.
2. Rotate the AMS knob to display “CREC MODE”.
3. Press the YES button to display the “CREC MID”.
4. When recording starts, “ **REC** ” is displayed, this becomes “CREC (@@@@)" (@@@@ is the address), and recording starts.
5. About 1 minute later, press the MENU/NO button to stop continuous recording.
6. Rotate the AMS knob to display “C PLAY MODE”.
7. Press the YES button to display “C PLAY MID”.
8. “C1 = □□□□ AD = □□” will be displayed.
9. Check that the C1 error becomes below 80 and the AD error below 2.
10. Press the MENU/NO button to stop playback, and press the ⏏ button and remove the disc.

## 5-7. INITIAL SETTING OF ADJUSTMENT VALUE

**Note:**
Mode which sets the adjustment results recorded in the non-volatile memory to the initial setting value. However the results of the temperature compensation offset adjustment will not change to the initial setting value.
If initial setting is performed, perform all adjustments again excluding the temperature compensation offset adjustment.
For details of the initial setting, refer to "5-4. Precautions on Adjustments" and execute the initial setting before the adjustment as required.

**Setting Procedure :**
1. Rotate the AMS knob to display "ADJ CLEAR".
2. Press the YES button. "Complete!" will be displayed momentarily and initial setting will be executed, after which "ADJ CLEAR" will be displayed.

## 5-8. RECORDING AND DISPLAYING THE IOP INFORMATION

The IOP data can be recorded in the non-volatile memory. The IOP value on the label of the optical pickup and the IOP value after the adjustment will be recorded. Recording these data eliminates the need to read the label on the optical pick-up.

**Recording Procedure :**
1. While pressing the AMS knob and ■ button, connect the power plug to the outlet, and release the AMS knob and ■ button.
2. Rotate the AMS knob to display "[Service]", and press the YES button.
3. Rotate the AMS knob to display "Iop.Write", and press the YES button.
4. The display becomes Ref=@@@.@ (@ is an arbitrary number) and the numbers which can be changed will blink.
5. Input the IOP value written on the optical pick-up.
   To select the number : Rotate the AMS knob.
   To select the digit : Press the AMS knob
6. When the YES button is pressed, the display becomes "Measu=@@@.@" (@ is an arbitrary number).
7. As the adjustment results are recorded for the 6 value. Leave it as it is and press the YES button.
8. "Complete!" will be displayed momentarily. The value will be recorded in the non-volatile memory and the display will become "Iop Write".

**Display Procedure :**
1. Rotate the AMS knob to display "Iop.Read".
2. "@@.@/##.#" is displayed and the recorded contents are displayed.
   @@.@ indicates the Iop value labeled on the pick-up.
   ##.# indicates the Iop value after adjustment
3. To end, press the AMS button or MENU/NO button to display "Iop Read".

## 5-9. TEMPERATURE COMPENSATION OFFSET ADJUTMENT

Save the temperature data at that time in the non-volatile memory as 25 ˚C reference data.

**Note :**
1. Usually, do not perform this adjustment.
2. Perform this adjustment in an ambient temperature of 22 ˚C to 28 ˚C. Perform it immediately after the power is turned on when the internal temperature of the unit is the same as the ambient temperature of 22 ˚C to 28 ˚C.
3. When D101 has been replaced, perform this adjustment after the temperature of this part has become the ambient temperature.

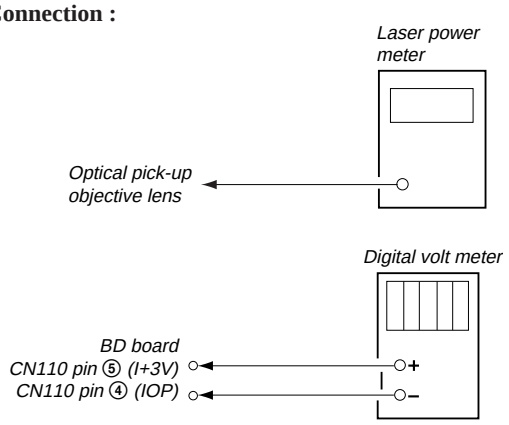
**Adjusting Procedure :**
1. Rotate the AMS knob and display "TEMP ADJUST".
2. Press the YES button and select the "TEMP ADJUST" mode.
3. "TEMP = □□ [OK]" and the current temperature data will be displayed.
4. To save the data, press the YES button.
   When not saving the data, press the MENU/NO button.
5. When the YES button is pressed, "TEMP = □□ SAVE" will be displayed and turned back to "TEMP ADJUST" display then. When the MENU/NO button is pressed, "TEMP ADJUST" will be displayed immediatelly.

**Specified Value :**
The "TEMP = □□" should be within "E0 - EF", "F0 - FF", "00 - 0F", "10 - 1F" and "20 - 2F".

## 5-10. LASER POWER ADJUSTMENT

Check the IOP value of the optical pick-up before adjustments. (Refer to 5-8. Recording and Displaying IOP Information.)

**Connection :**




**Adjusting Procedure :**
1. Set the laser power meter on the objective lens of the optical pick-up. (When it cannot be set properly, press the ◀◀ button or ▶▶ button to move the optical pick-up.)
   Connect the digital volt meter to CN110 pin ⑤ (I+3V) and CN110 pin ④ (IOP).
2. Rotate the AMS knob and display "LDPWR ADJUST".
   (Laser power : For adjustment)
3. Press the YES button once and display "LD 0.9 mW $ □□".
4. Rotate the AMS knob so that the reading of the laser power meter becomes 0.85 to 0.91 mW. Press the YES button after setting the range knob of the laser power meter, and save the adjustment results. ("LD SAVE $ □□" will be displayed for a moment.)
5. Then "LD 7.0 mW $ □□" will be displayed.
6. Rotate the AMS knob so that the reading of the laser power meter becomes 6.9 to 7.1 mW, press the YES button and save it.

**Note :** Do not perform the emission with 7.0 mW more than 15 seconds continuously.

7. Then, rotate the AMS knob and display “LDPWR CHECK”.
8. Press the YES button once and display “0.9 mW ✱✱✱ $ ”. Check that the reading of the laser power meter become 0.85 to 0.91 mW. (✱✱✱ means IOP value)
9. Press the YES button once more and display “7.0 mW ✱✱✱ $ ”. Check that the reading the laser power meter and digital volt meter satisfy the specified value.
   Note down the digital voltmeter reading value.

**Specified Value :**

Laser power meter reading : 7.0 ± 0.1 mW
Digital voltmeter reading : Optical pick-up displayed value ± 10%

(Optical pick-up label)

KMS260A
27X40
B0825

*(For details of the method for checking this value, refer to “5-8. Recording and Displaying IOP Information”.)*

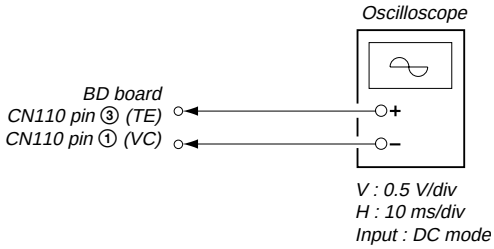
*Iop = 82.5 mA in this case*
*Iop (mA) = Digital voltmeter reading (mV)/1 (Ω)*

10. Press the MENU/NO button and display “LDPWR CHECK” and stop the laser emission.
    (The MENU/NO button is effective at all times to stop the laser emission.)
11. Rotate the AMS knob to display “Iop.Write”.
12. Press the YES button. When the display becomes Ref=@@@.@ (@ is an arbitrary number), press the YES button to display “Measu=@@@.@” (@ is an arbitrary number).
13. The numbers which can be changed will blink. Input the Iop value noted down at step 9.
    To select the number : Rotate the AMS knob.
    To select the digit : Press the AMS knob
14. When the YES button is pressed, “Complete!” will be displayed momentarily. The value will be recorded in the non-volatile memory and the display will become “Iop Write”.

**Note 1:** After step 4, each time the YES button is pressed, the display will be switched between “0.7 mW ✱✱✱ $ ”, “6.2 mW ✱✱✱ $ ”, and “Wp ホセイ ✱✱✱ $ ”. Nothing needs to be performed here.

## 5-11. TRAVERSE ADJUSTMENT

**Connection :**

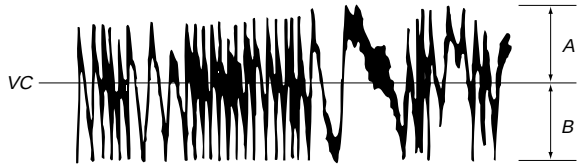



*V : 0.5 V/div*
*H : 10 ms/div*
*Input : DC mode*

**Adjusting Procedure :**

1. Connect an oscilloscope to CN110 pin ③ (TE) and CN110 pin ① (VC) of the BD board.
2. Load a disc (any available on the market). (Refer to Note 1.)
3. Press the ▶▶ button and move the optical pick-up outside the pit.
4. Rotate the AMS knob and display “EF MO ADJUST”.
5. Press the YES button and display “EFB = MO-R”.
   (Laser power READ power/Focus servo ON/tracking servo OFF/spindle (S) servo ON)
6. Rotate the AMS knob so that the waveform of the oscilloscope becomes the specified value.
   (When the AMS knob is rotated, the  of “EFB= ” changes and the waveform changes.) In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.
   (Read power traverse adjustment)

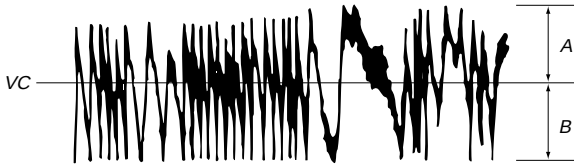
(Traverse Waveform)




*Specification A = B*

7. Press the YES button and save the result of adjustment to the non-volatile memory (“EFB = SAVE” will be displayed for a moment. Then “EFB = MO-W” will be displayed).
8. Rotate the AMS knob so that the waveform of the oscilloscope becomes the specified value.
   (When the AMS knob is rotated, the  of “EFB- ” changes and the waveform changes.) In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.
   (Write power traverse adjustment)

(Traverse Waveform)

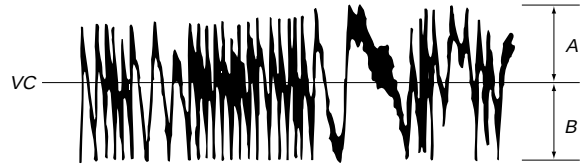



*Specification A = B*

9. Press the YES button, and save the adjustment results in the non-volatile memory. (“EFB = SAVE” will be displayed for a moment.)
10. “EFB = MO-P”. will be displayed.
    The optical pick-up moves to the pit area automatically and servo is imposed.

11. Rotate the AMS knob until the waveform of the oscilloscope moves closer to the specified value.
    In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.

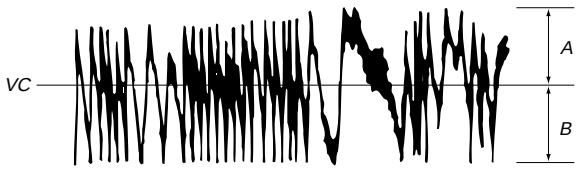
(Traverse Waveform)




*Specification A = B*

12. Press the YES button, and save the adjustment results in the non-volatile memory. ("EFB = ▯▯ SAVE" will be displayed for a moment.)
    Next "EF MO ADJUST" is displayed. The disc stops rotating automatically.
13. Press the ⏏ button and remove the disc.
14. Load the check disc (MD) TDYS-1.
15. Roteto AMS knob and display "EF CD ADJUST".
16. Press the YES button and display "EFB = ▯▯ CD". Servo is imposed automatically.
17. Rotate the AMS knob so that the waveform of the oscilloscope moves closer to the specified value.
    In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.

(Traverse Waveform)

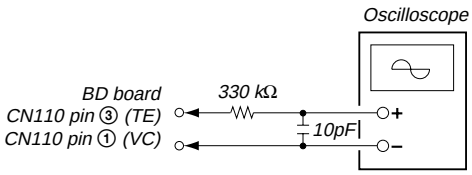



*Specification A = B*

18. Press the YES button, display "EFB = ▯▯ SAVE" for a moment and save the adjustment results in the non-volatile memory. Next "EF CD ADJUST" will be displayed.
19. Press the ⏏ button and remove the check disc (MD) TDYS-1.

**Note 1 :** MO reading data will be erased during if a recorded disc is used in this adjustment.

**Note 2 :** If the traverse waveform is not clear, connect the oscilloscope as shown in the following figure so that it can be seen more clearly.



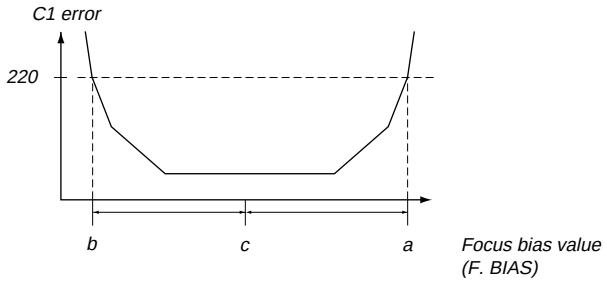

## 5-12. FOCUS BIAS ADJUSTMENT

**Adjusting Procedure :**

1. Load a test disk (MDW-74/AU-1).
2. Rotate the AMS knob and display "CPLAY MODE".
3. Press the YES button and display "CPLAY MID".
4. Press the MENU/NO button when "C1 = ▯▯▯▯ AD = ▯▯" is displayed.
5. Rotate the AMS knob and display "FBIAS ADJUST".
6. Press the YES button and display " ▯▯▯▯/▯▯ a = ▯▯".
   The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [a =] indicate the focus bias value.
7. Rotate the AMS knob in the clockwise direction and find the focus bias value at which the C1 error rate becomes 220 (Refer to Note 2).
8. Press the YES button and display " ▯▯▯▯/▯▯ b = ▯▯".
9. Rotate the AMS knob in the counterclockwise direction and find the focus bias value at which the C1 error rate becomes 220.
10. Press the YES button and display " ▯▯▯▯/▯▯ c = ▯▯".
11. Check that the C1 error rate is below 50 and ADER is 00. Then press the YES button.
12. If the "(▯▯" in "▯▯ - ▯▯ - ▯▯ (▯▯" is above 20, press the YES button.
    If below 20, press the MENU/NO button and repeat the adjustment from step 2.
13. Press the ⏏ button to remove the test disc.

**Note 1 :** The relation between the C1 error and focus bias is as shown in the following figure. Find points a and b in the following figure using the above adjustment. The focal point position C is automatically calculated from points a and b.

**Note 2 :** As the C1 error rate changes, perform the adjustment using the average vale.



## 5-13. ERROR RATE CHECK

### 5-13-1. CD Error Rate Check

**Checking Procedure :**

1. Load a check disc (MD) TDYS-1.
2. Rotate the AMS knob and display “CPLAY MODE”.
3. Press the YES button twice and display “CPLAY MID”.
4. The display changes to “C1 = □□□□ AD = □□”.
5. Check that the C1 error rate is below 20.
6. Press the MENU/NO button, stop playback, press the ⏏ button, and remove the test disc.

### 5-13-2. MO Error Rate Check

**Checking Procedure :**

1. Load a test disc (MDW-74/AU-1).
2. Rotate the AMS knob and display “CPLAY MODE”.
3. Press the YES button and display “CPLAY MID”.
4. The display changes to “C1 = □□□□ AD = □□”.
5. If the C1 error rate is below 50, check that ADER is 00.
6. Press the MENU/NO button, stop playback, press the ⏏ button, and remove the test disc.

## 5-14. FOCUS BIAS CHECK

Change the focus bias and check the focus tolerance amount.

**Checking Procedure :**

1. Load a test disc (MDW-74/AU-1).
2. Rotate the AMS knob and display “CPLAY MODE”.
3. Press the YES button twice and display “CPLAY MID”.
4. Press the MENU/NO button when “C1 = □□□□ AD = □□” is displayed.
5. Rotate the AMS knob and display “FBIAS CHECK”.
6. Press the YES button and display “ □□□□/□□ c = □□”.
   The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [c =] indicate the focus bias value.
   Check that the C1 error is below 50 and ADER is below 2.
7. Press the YES button and display “ □□□□/□□ b = □□”.
   Check that the C1 error is below 220 and ADER is below 2.
8. Press the YES button and display “ □□□□/□□ a = □□”.
   Check that the C1 error is below 220 and ADER is below 2
9. Press the MENU/NO button, next press the ⏏ button, and remove the continuously recorded disc.

**Note 1 :** If the C1 error and ADER are above other than the specified value at points a (step 8. in the above) or b (step 7. in the above), the focus bias adjustment may not have been carried out properly. Adjust perform the beginning again.

## 5-15. AUTO GAIN CONTROL OUTPUT LEVEL ADJUSTMENT

Be sure to perform this adjustment when the pickup is replaced. If the adjustment results becomes “Adjust NG!”, the pickup may be faulty or the servo system circuits may be abnormal.

### 5-15-1. CD Auto Gain Control Output Level Adjustment

**Adjusting Procedure :**

1. Insert the check disc (MD) TDYS-1.
2. Rotate the AMS knob to display “AG Set (CD)”.
3. When the YES button is pressed, the adjustment will be performed automatically.
   “Complete!!” will then be displayed momentarily when the value is recorded in the non-volatile memory, after which the display changes to “AG Set (CD)”.
4. Press the ⏏ button to remove the disc.

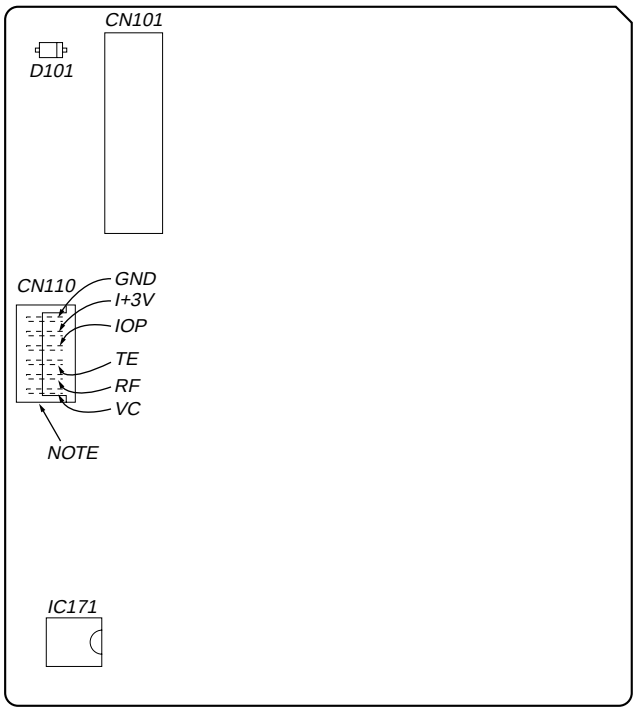
### 5-15-2. MO Auto Gain Control Output Level Adjustment

**Adjusting Procedure :**

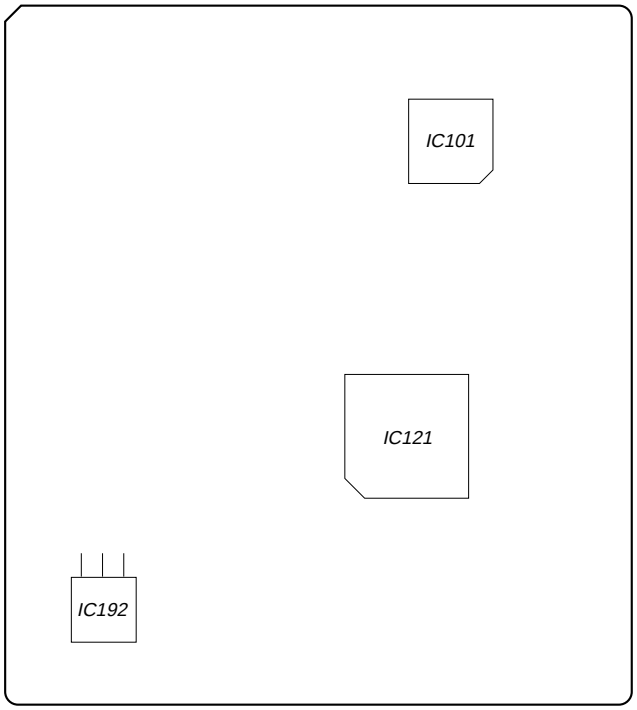
1. Insert the reference disc (MDW-74/AU-1) for recording.
2. Rotate the AMS knob to display “AG Set (MO)”.
3. When the YES button is pressed, the adjustment will be performed automatically.
   “Complete!!” will then be displayed momentarily when the value is recorded in the non-volatile memory, after which the display changes to “AG Set (MO)”.
4. Press the ⏏ button to remove the disc.

## 5-15. ADJUSTING POINTS AND CONNECTING POINTS

**[BD BOARD] (SIDE A)**



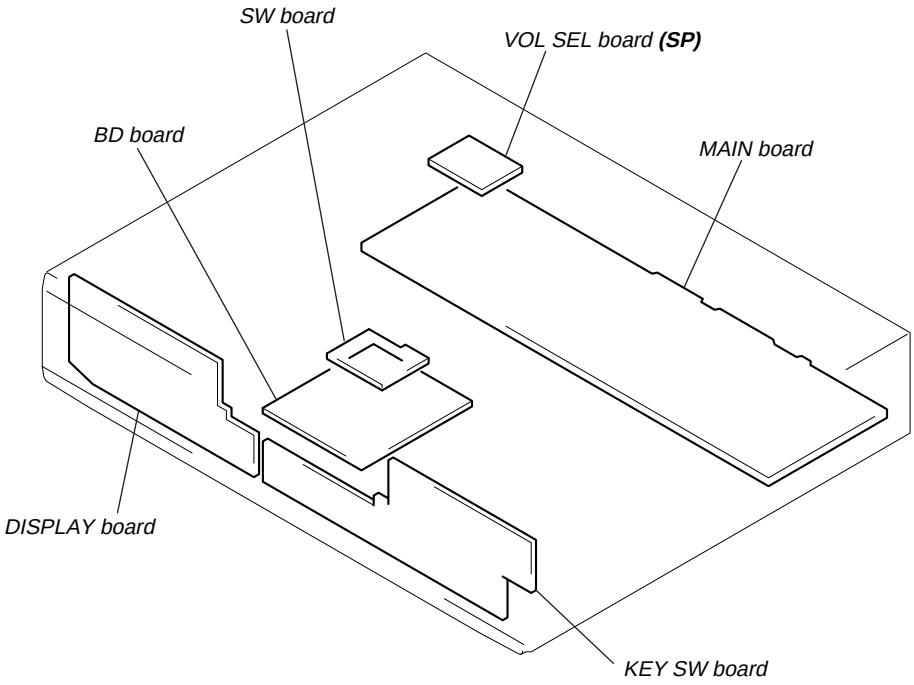

**[BD BOARD] (SIDE B)**




**NOTE:** It is useful to use the jig. for checking the waveform. (Refer to Servicing Note on page 6.)

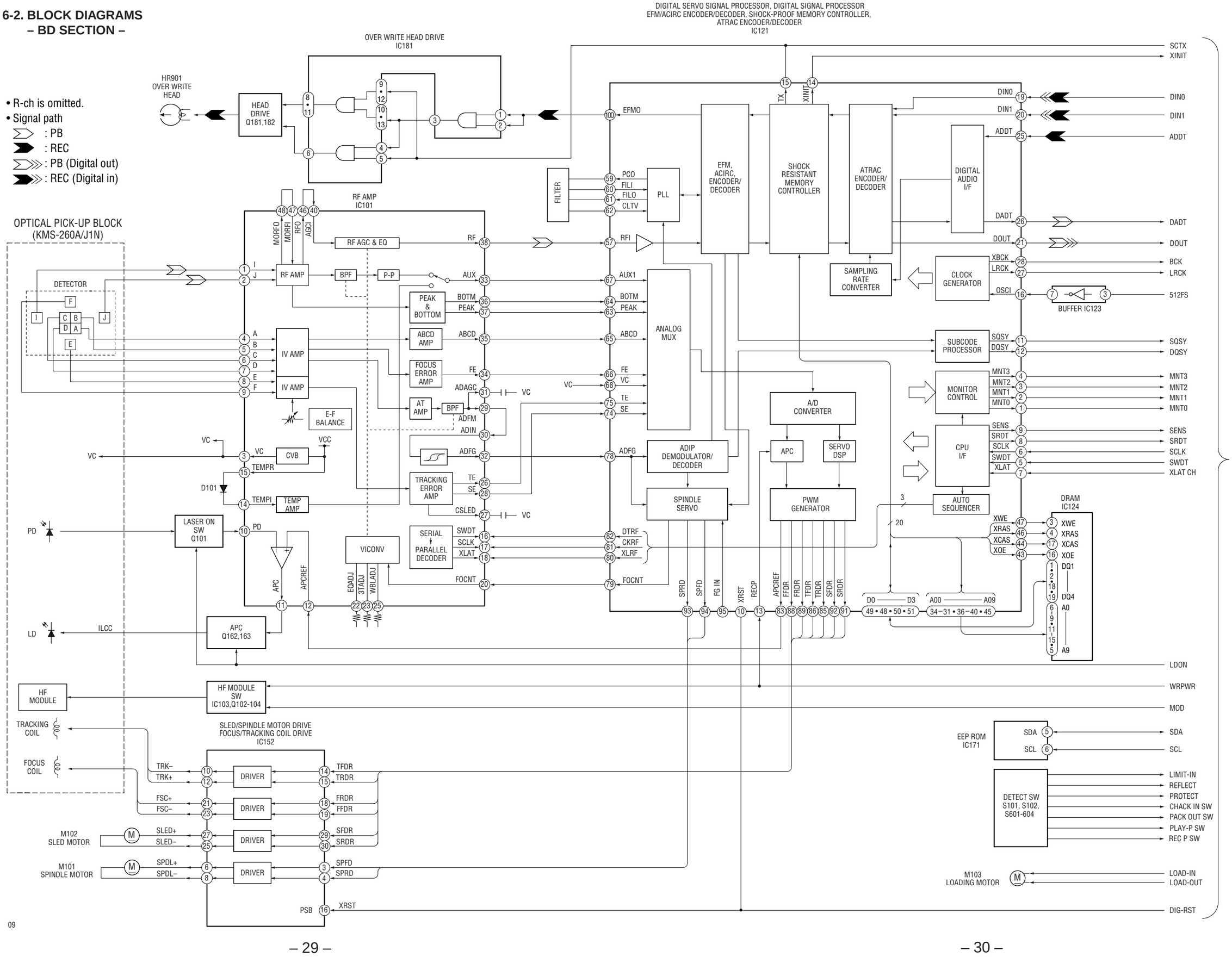
# SECTION 6
# DIAGRAMS

## 6-1. CIRCUIT BOARDS LOCATION



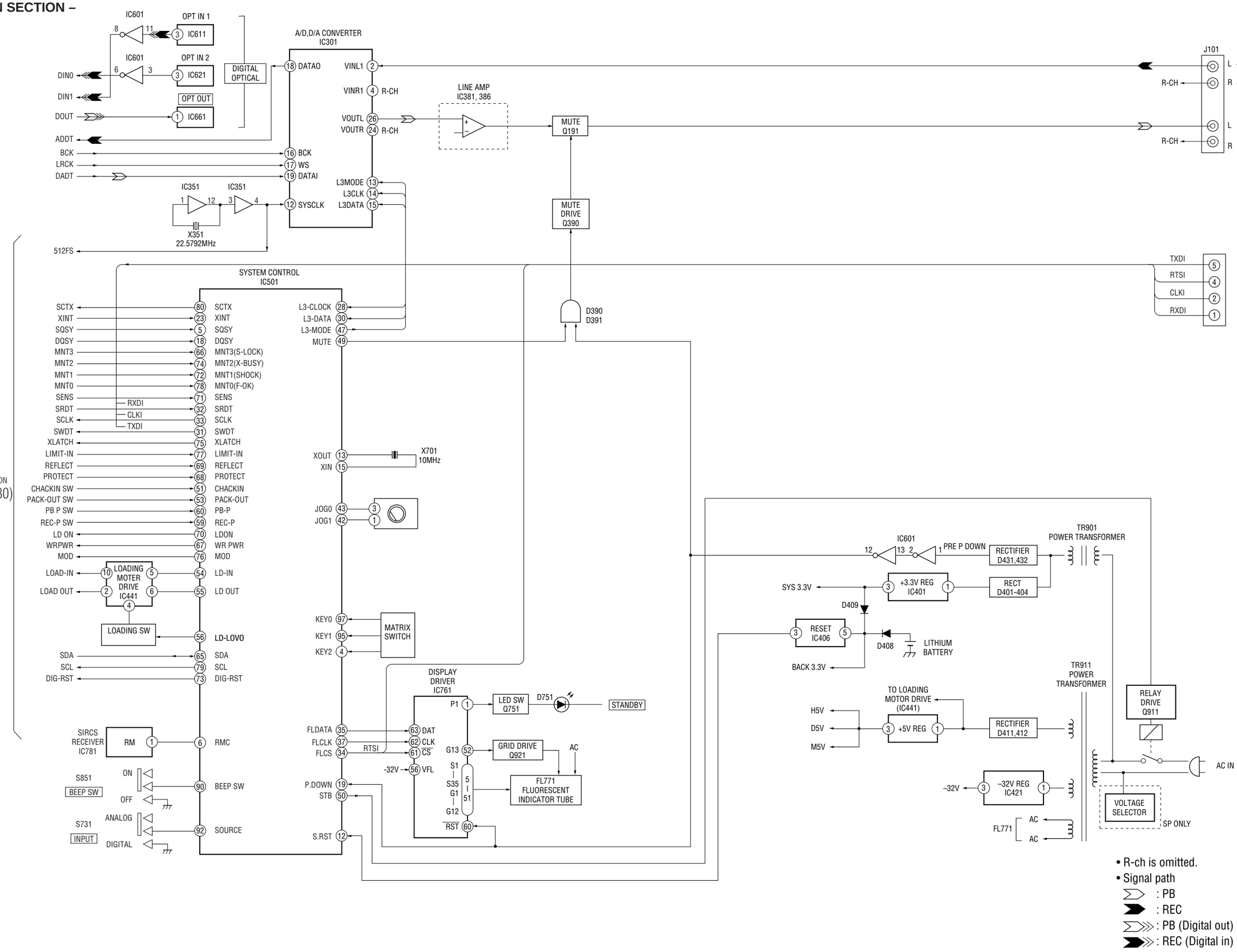
## 6-2. BLOCK DIAGRAMS – BD SECTION –

- R-ch is omitted.
- Signal path
  - : PB
  - : REC
  - : PB (Digital out)
  - : REC (Digital in)




09

## – MAIN SECTION –




BD SECTION
(Page 30)

09

- R-ch is omitted.
- Signal path
  - : PB
  - : REC
  - : PB (Digital out)
  - : REC (Digital in)

**THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.**
**(In addition to this, the necessary note is printed in each block.)**

### For schematic diagrams.

**Note:**

- All capacitors are in µF unless otherwise noted. pF: µµF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4 W or less unless otherwise specified.
- △ : internal component.
- ▭ : panel designation.

| **Note:** | **Note:** |
|---|---|
| The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified. | Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une piéce portant le numéro spécifié. |

- B+ : B+ Line.
- B– : B– Line.
- ▭ : adjustment for repair.
- no mark : STOP
  ( ) : Play the test disc (TDYS-1)
  < > : REC
  ✻ : Can not be measured.
- Voltages are taken with a VOM (Input impedance 10 MΩ). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- Signal path.
  : PB
  : REC
  : PB (DIGITAL OUT)
  : REC (DIGITAL IN)
- Abbreviation
  CND : Canadian model.
  SP : Singapore model.

### For printed wiring boards.

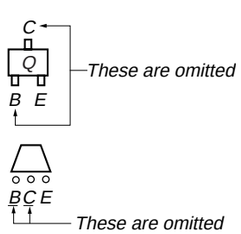
**Note:**

- ○——— : parts extracted from the component side.
- ——— : parts extracted from the conductor side.
- ○ : Through hole.
- ▒▒ : Pattern from the side which enables seeing.

(The other layers' patterns are not indicated.)

| Caution: | |
|---|---|
| Pattern face side: (Side B) | Parts on the pattern face side seen from the pattern face are indicated. |
| Parts face side: (Side A) | Parts on the parts face side seen from the parts face are indicated. |

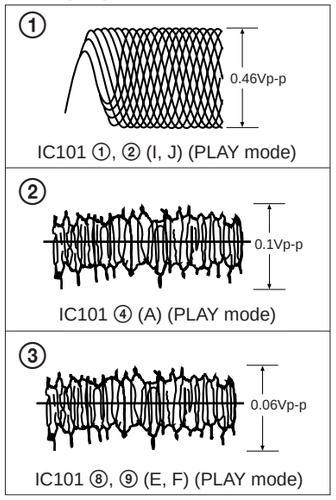
- **Indication of transistor**



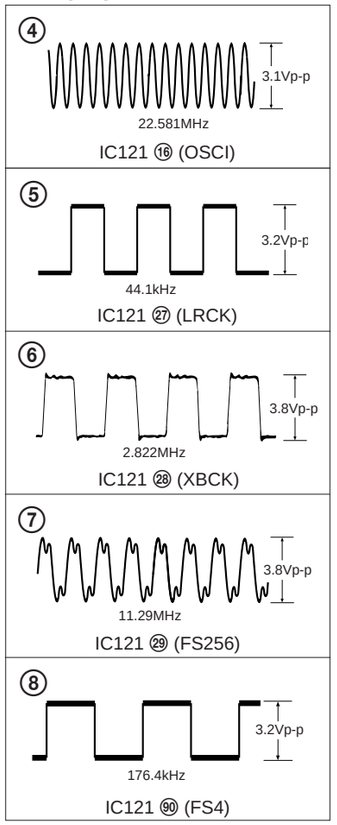



## WAVEFORMS

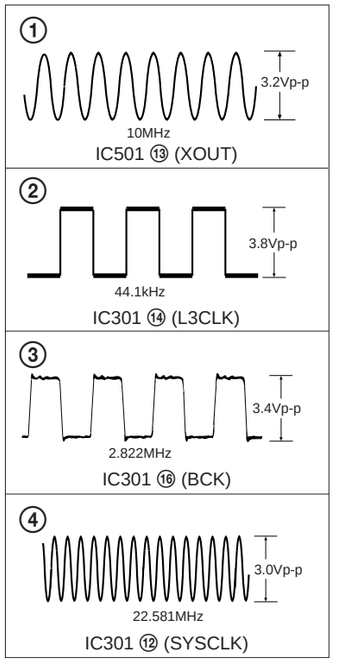
### – BD (1/2) SECTION –



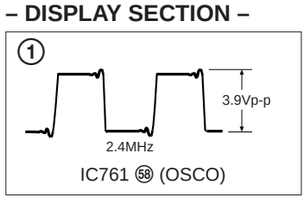

### – BD (2/2) SECTION –




### – MAIN SECTION –

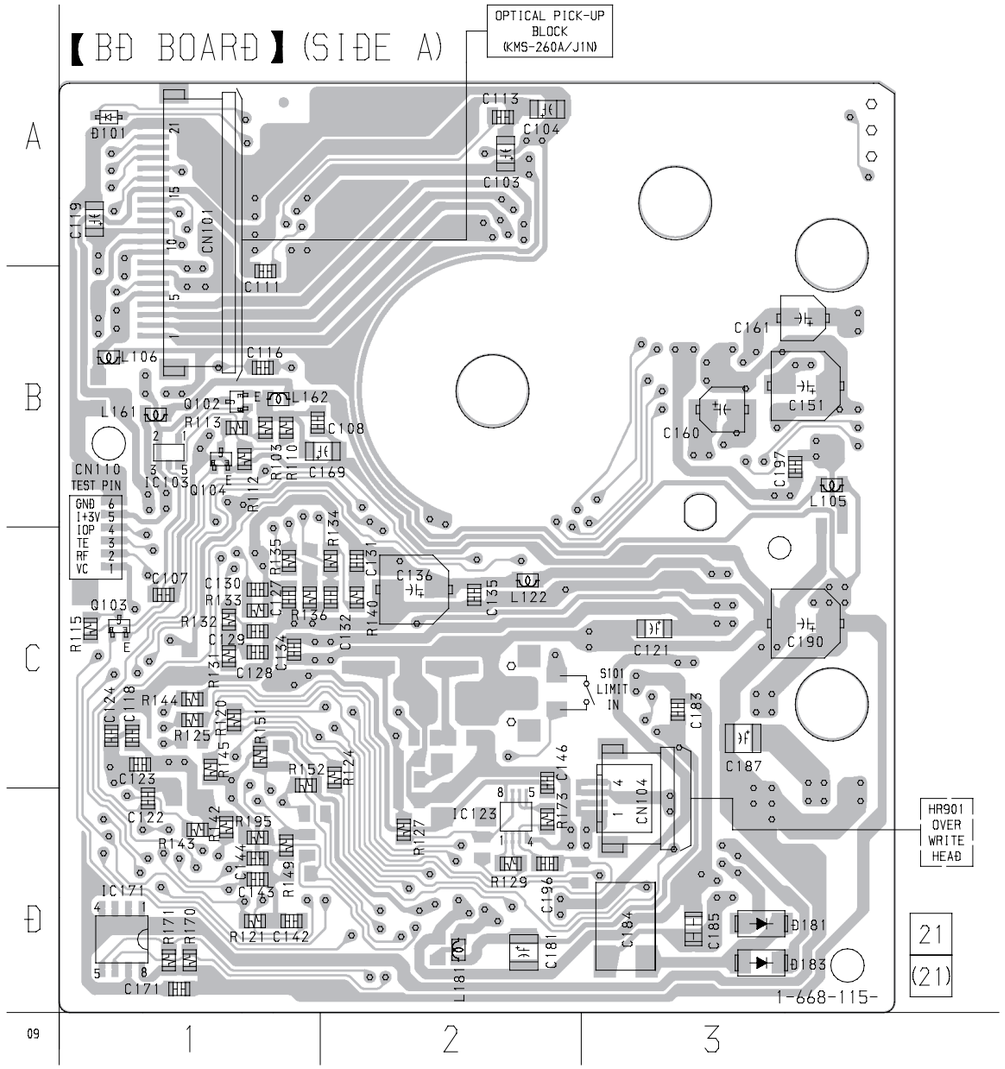


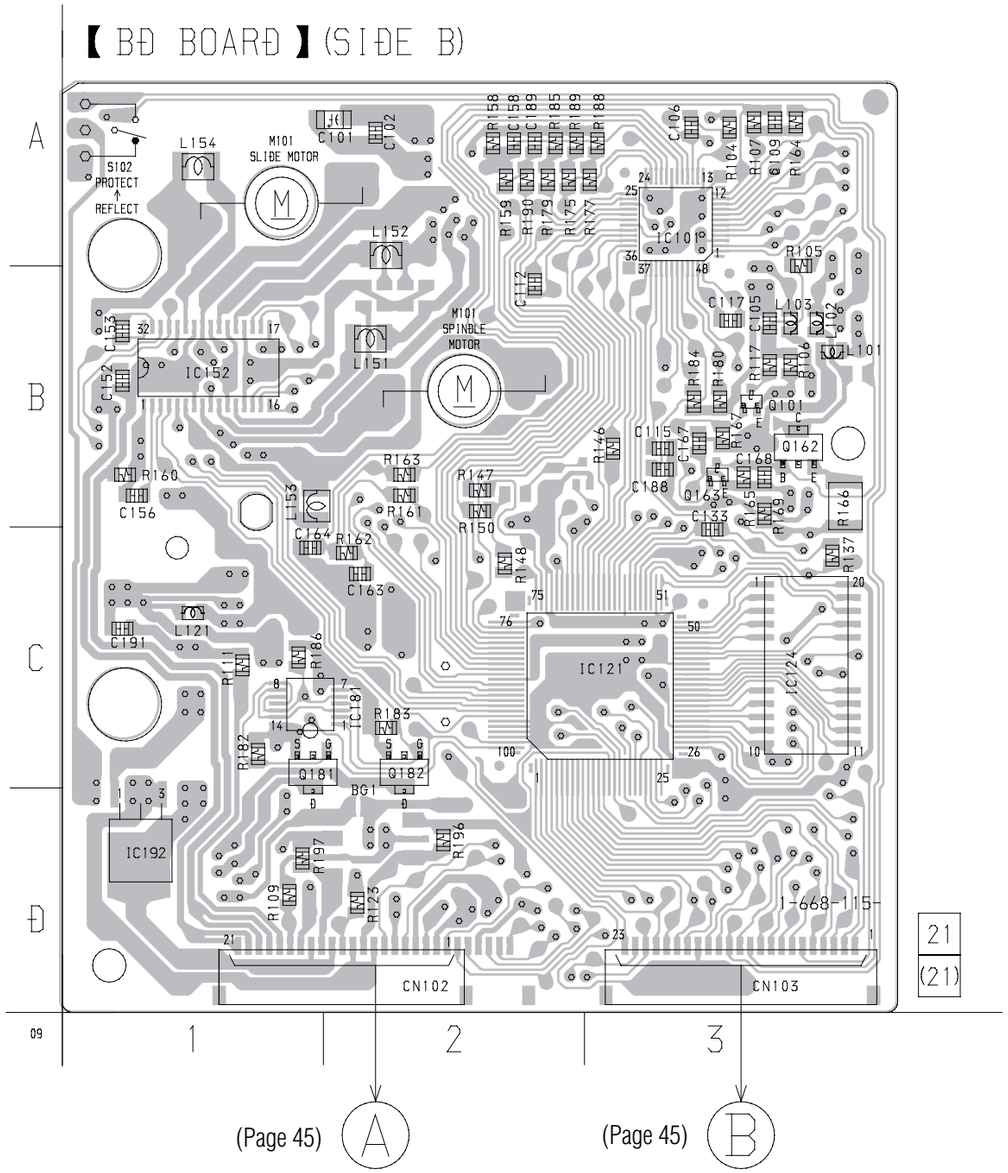

### – DISPLAY SECTION –



### 6-3. PRINTED WIRING BOARD – BD SECTION –

• See page 28 for Circuit Boards Location.




• **Semiconductor Location**

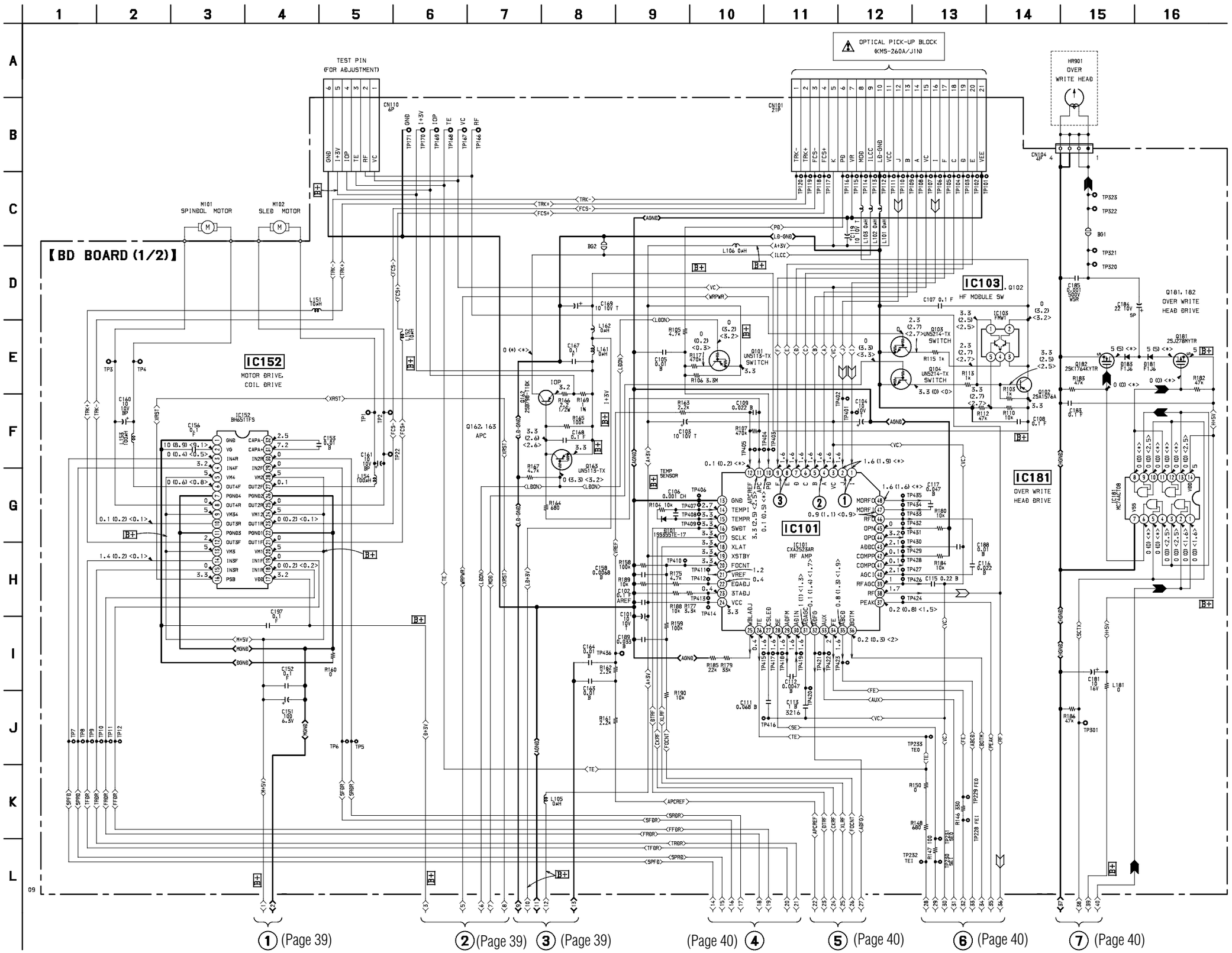
| Ref. No. | Location |
|---|---|
| D101 | A-1 |
| D181 | D-3 |
| D183 | D-3 |
| IC103 | B-1 |
| IC123 | D-2 |
| IC171 | D-1 |
| Q102 | B-1 |
| Q103 | B-1 |
| Q104 | B-1 |

• **Semiconductor Location**

| Ref. No. | Location |
|---|---|
| IC101 | A-3 |
| IC121 | C-3 |
| IC124 | C-3 |
| IC152 | B-1 |
| IC181 | C-1 |
| IC192 | D-1 |
| Q101 | B-3 |
| Q162 | B-3 |
| Q163 | B-3 |
| Q181 | C-1 |
| Q182 | C-2 |

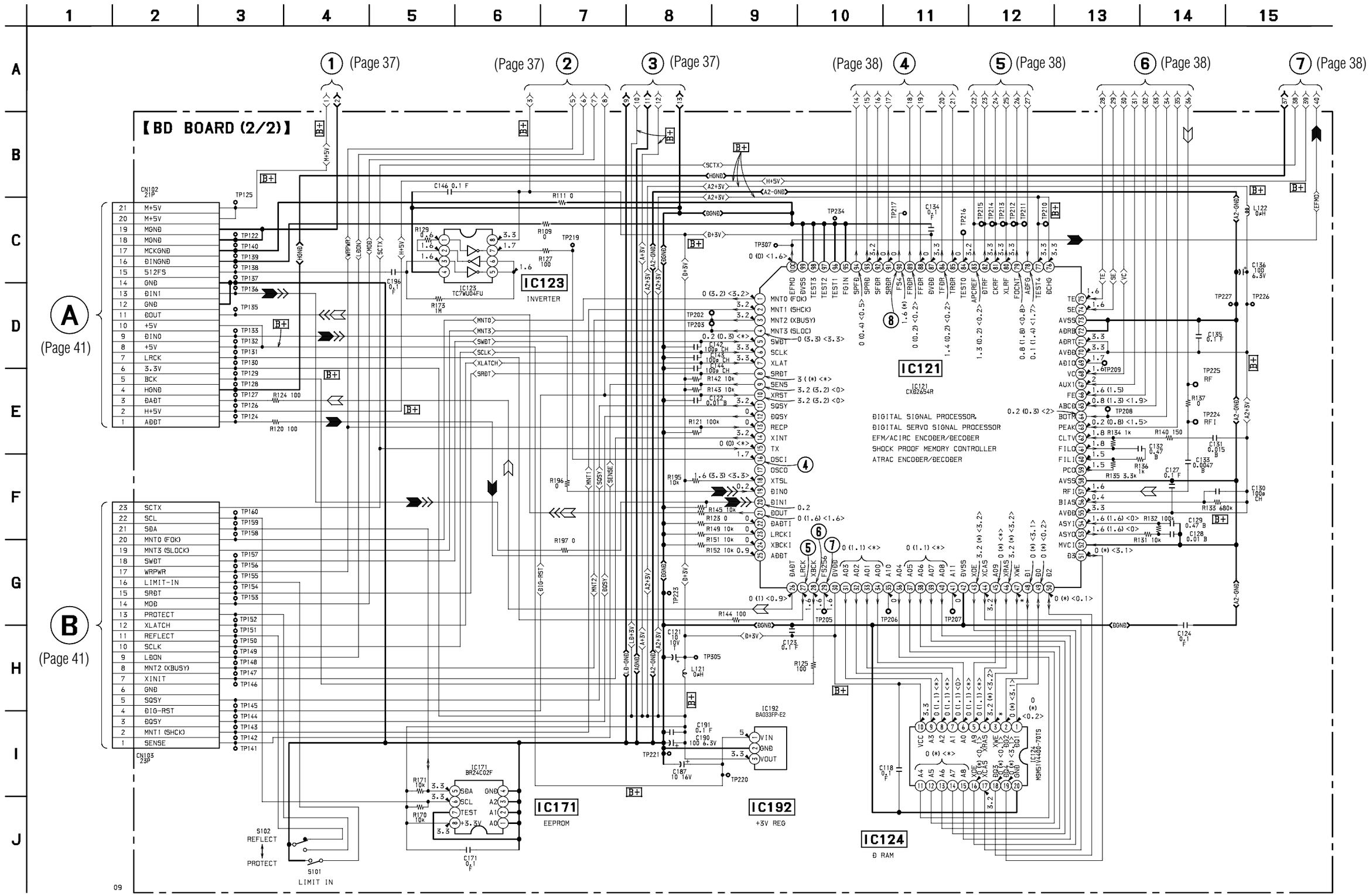
## 6-4. SCHEMATIC DIAGRAM – BD (1/2) SECTION –


- See page 34 for Waveforms.
- See page 52 for IC Block Diagrams.
- See page 55 for IC Pin Functions.

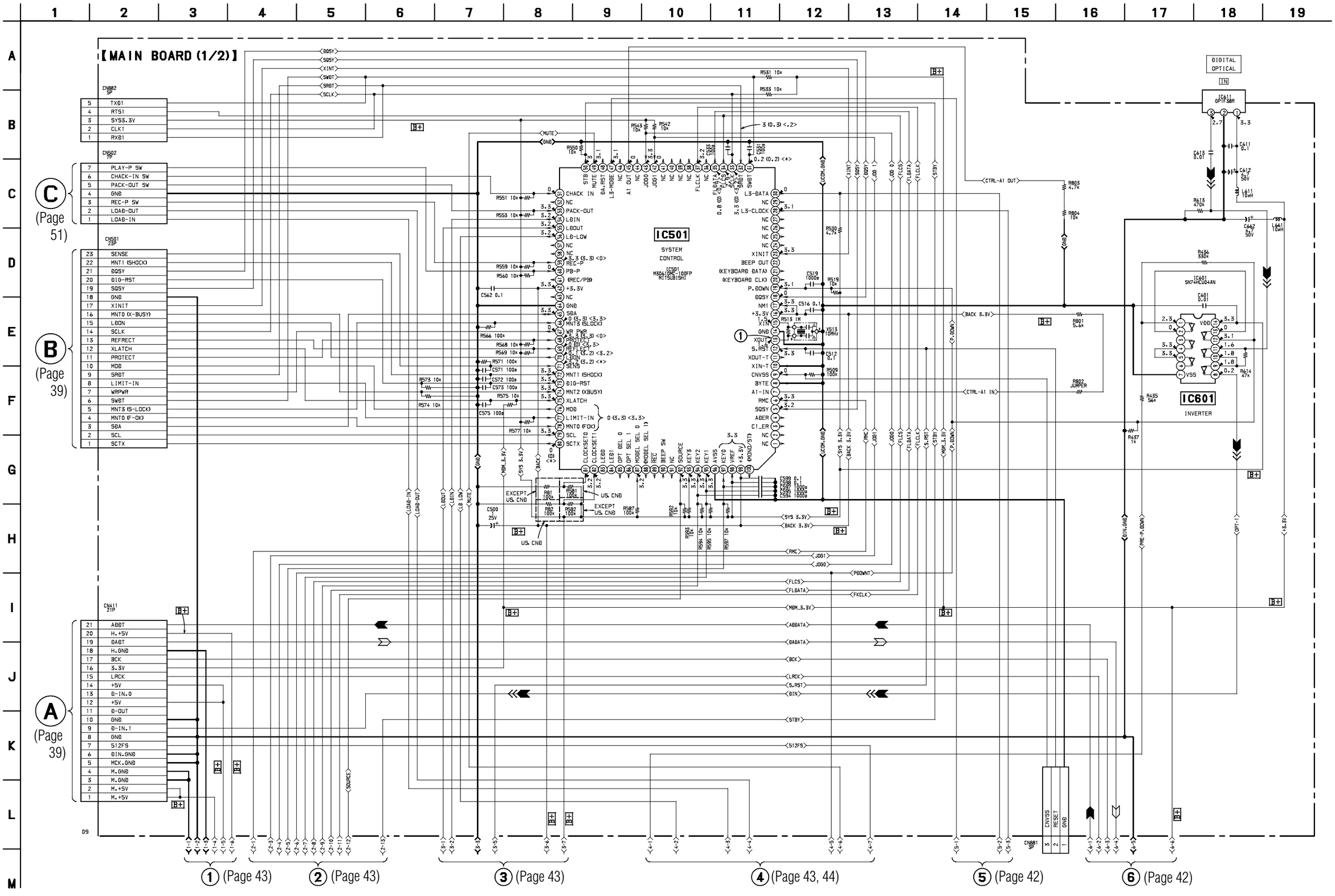
## 6-5. SCHEMATIC DIAGRAM – BD (2/2) SECTION –


- See page 34 for Waveforms.
- See page 35 for Printed Wiring Board.

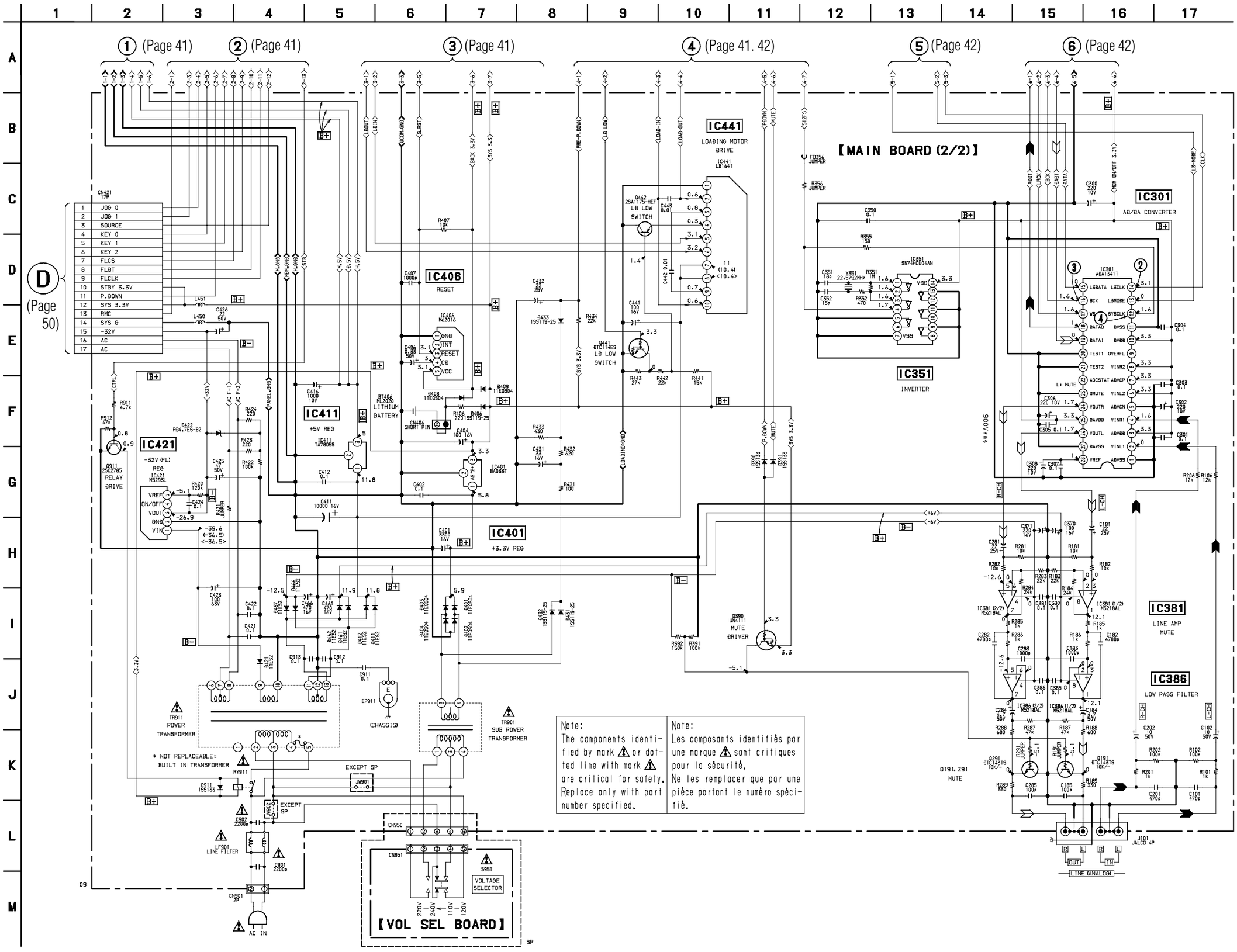
## 6-6. SCHEMATIC DIAGRAM – MAIN (1/2) SECTION –

- **See page 34 for Waveforms.**
- **See page 45 for Printed Wiring Board.**
- **See page 59 for IC Pin Functions.**



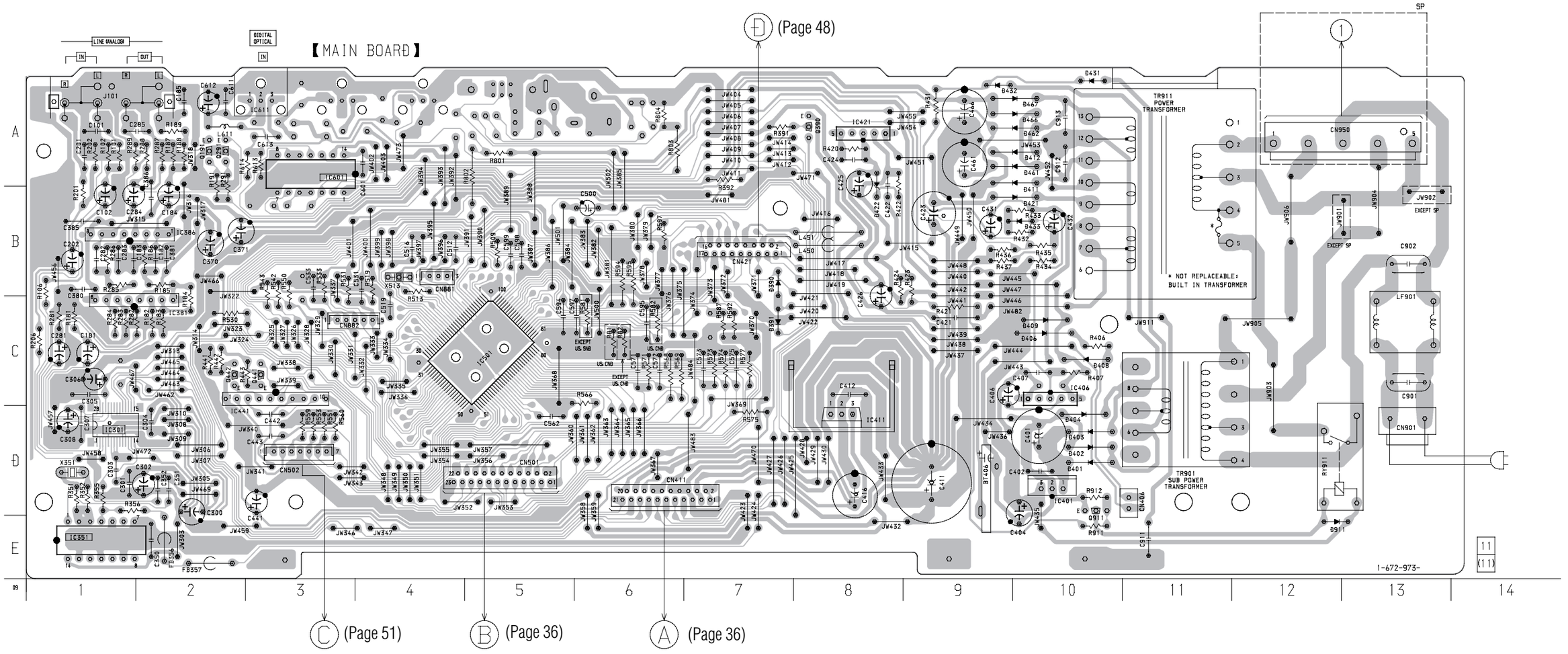
## 6-7. SCHEMATIC DIAGRAM – MAIN (2/2) SECTION –

- See page 34 for Waveforms.
- See page 54 for IC Block Diagrams.



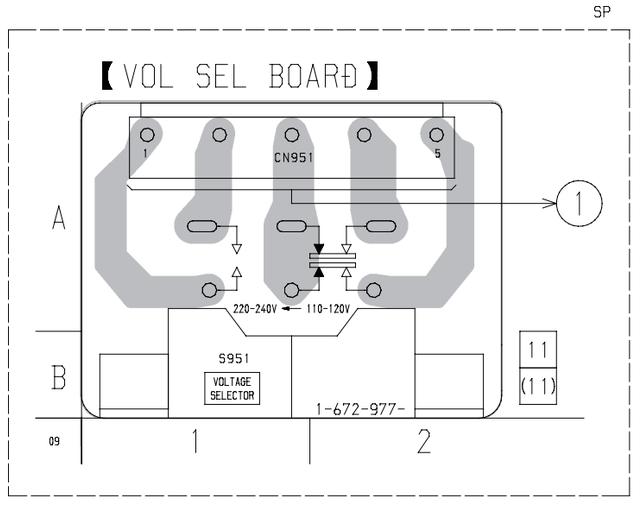
## 6-8. PRINTED WIRING BOARD – MAIN SECTION –

• See page 28 for Circuit Boards Location.




• **Semiconductor Location**

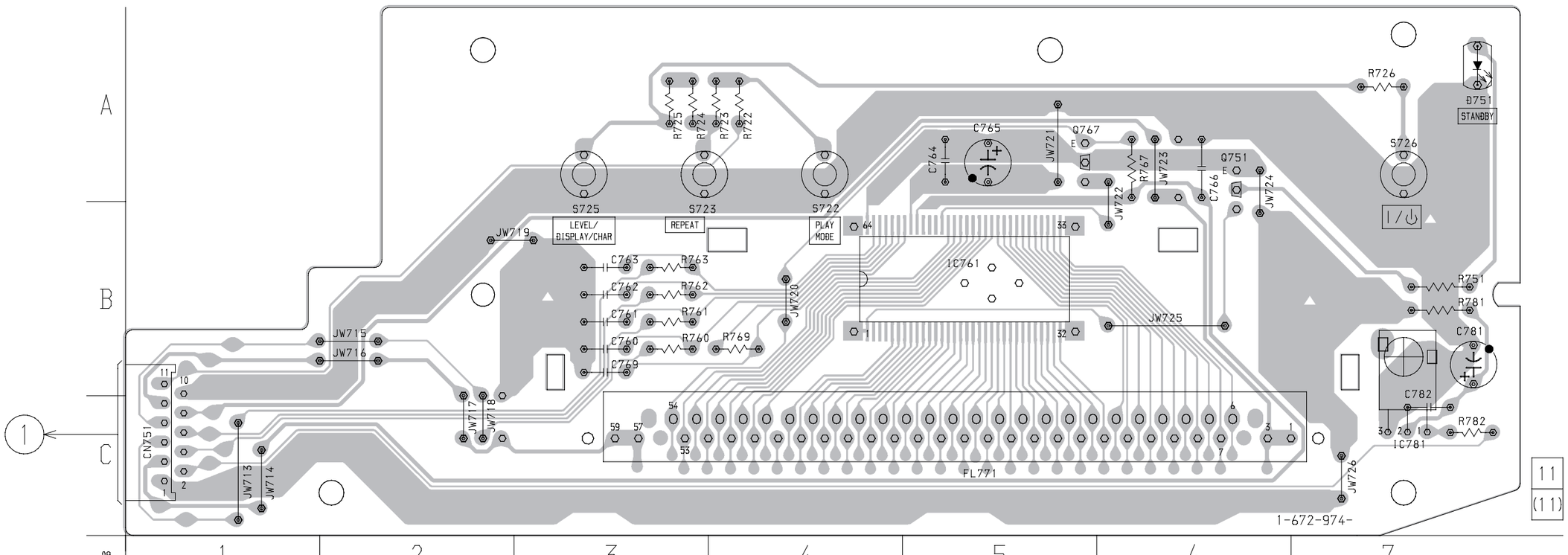
| Ref. No. | Location | Ref. No. | Location |
|---|---|---|---|
| D390 | B-7 | | |
| D391 | C-7 | IC301 | D-1 |
| D401 | D-10 | IC351 | E-1 |
| D402 | D-10 | IC381 | C-2 |
| D403 | D-10 | IC386 | B-2 |
| D404 | D-10 | IC401 | D-10 |
| D406 | C-10 | IC406 | C-10 |
| D408 | C-10 | IC411 | D-8 |
| D409 | C-10 | IC421 | A-8 |
| D411 | A-10 | IC441 | C-3 |
| D412 | A-10 | IC501 | C-5 |
| D421 | B-10 | IC601 | A-3 |
| D422 | A-8 | IC611 | A-3 |
| D431 | A-10 | | |
| D432 | A-9 | Q191 | A-2 |
| D433 | B-10 | Q291 | A-2 |
| D461 | A-10 | Q390 | A-8 |
| D462 | A-10 | Q441 | C-3 |
| D466 | A-10 | Q442 | C-2 |
| D467 | A-10 | Q911 | D-10 |
| D911 | E-12 | | |



## 6-9. PRINTED WIRING BOARD – PANEL SECTION –

• See page 28 for Circuit Boards Location.

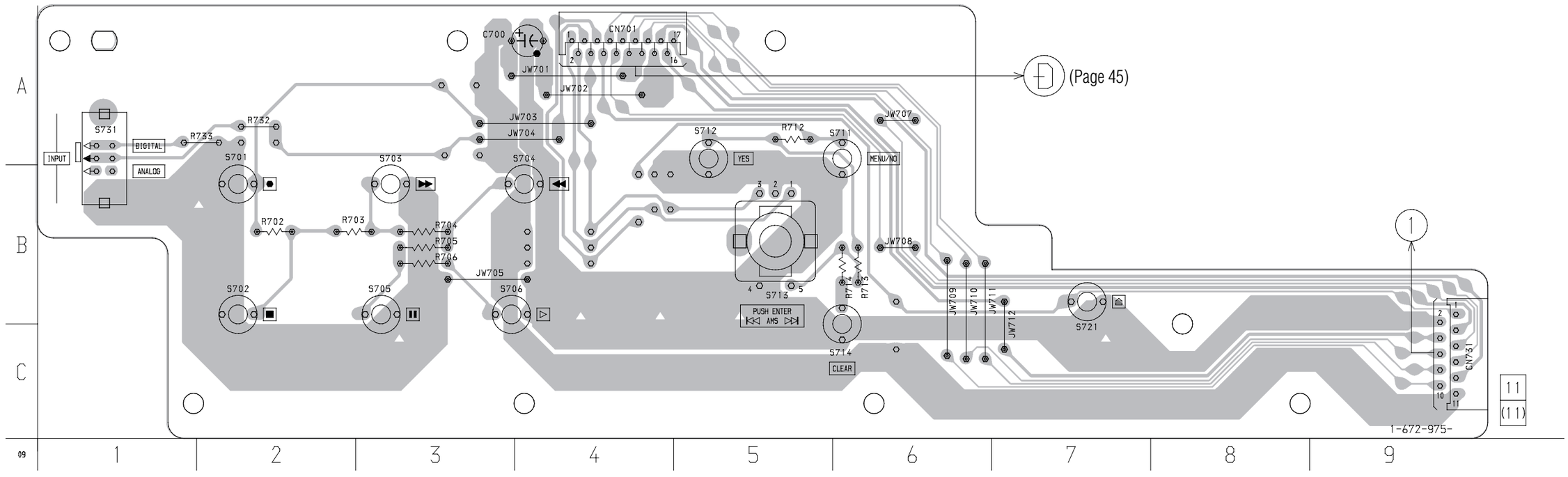
【DISPLAY BOARD】




• **Semiconductor Location**

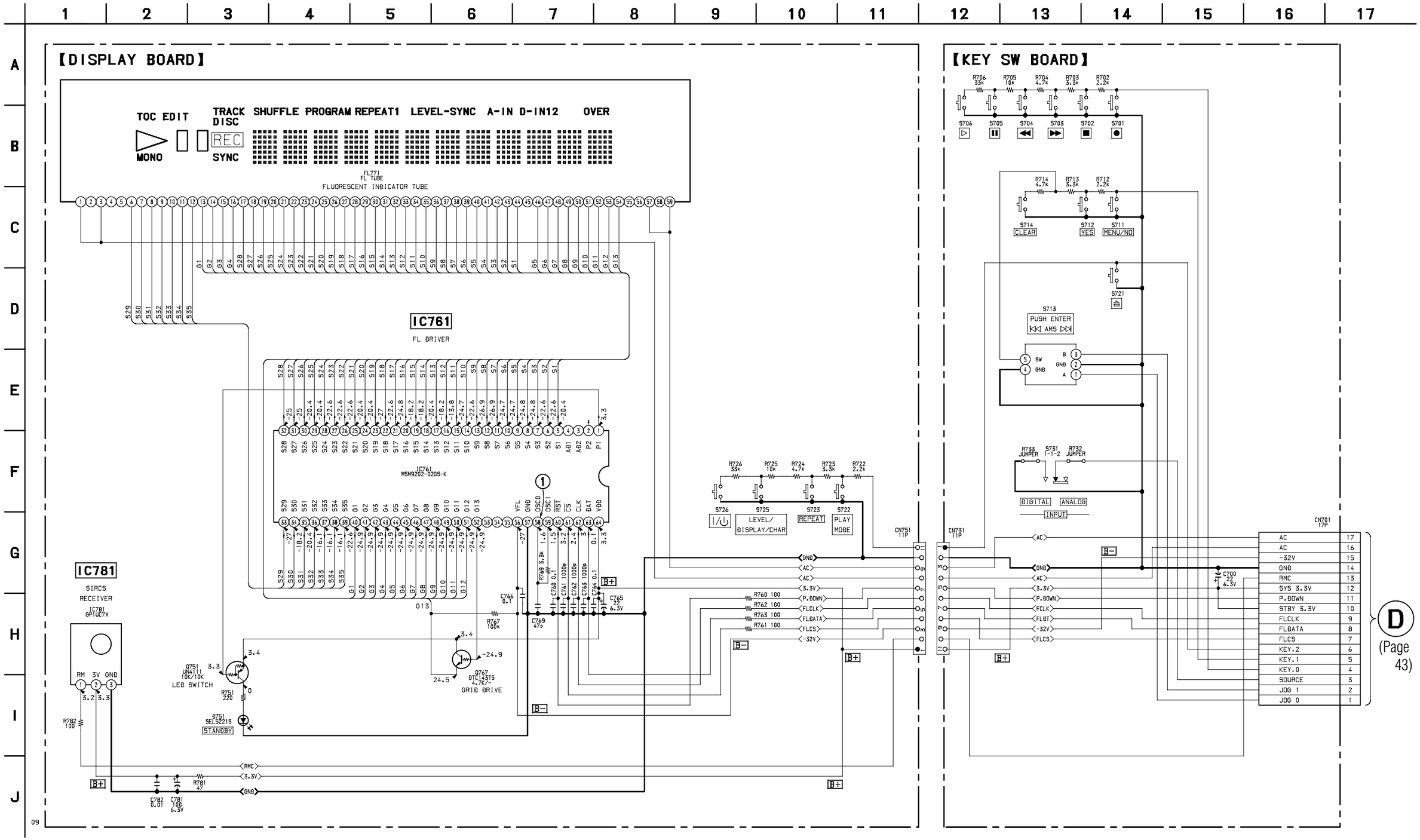
| Ref. No. | Location |
|---|---|
| D751 | A-1 |
| IC761 | B-5 |
| IC781 | B-7 |
| Q751 | A-6 |
| Q767 | A-5 |

【KEY SW BOARD】

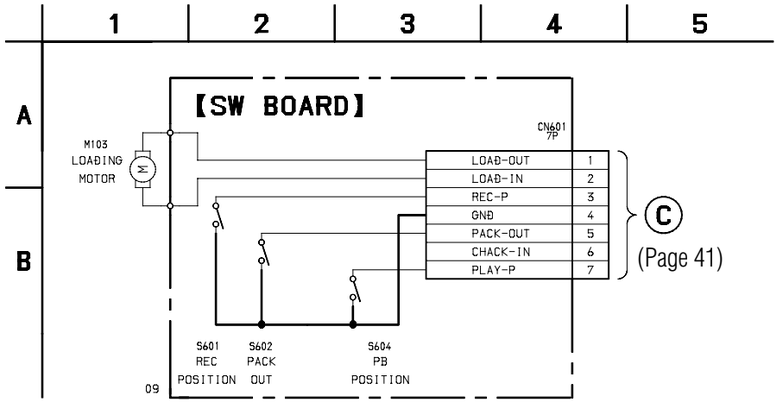


## 6-10. SCHEMATIC DIAGRAM – PANEL SECTION –

• See page 34 for Waveforms.

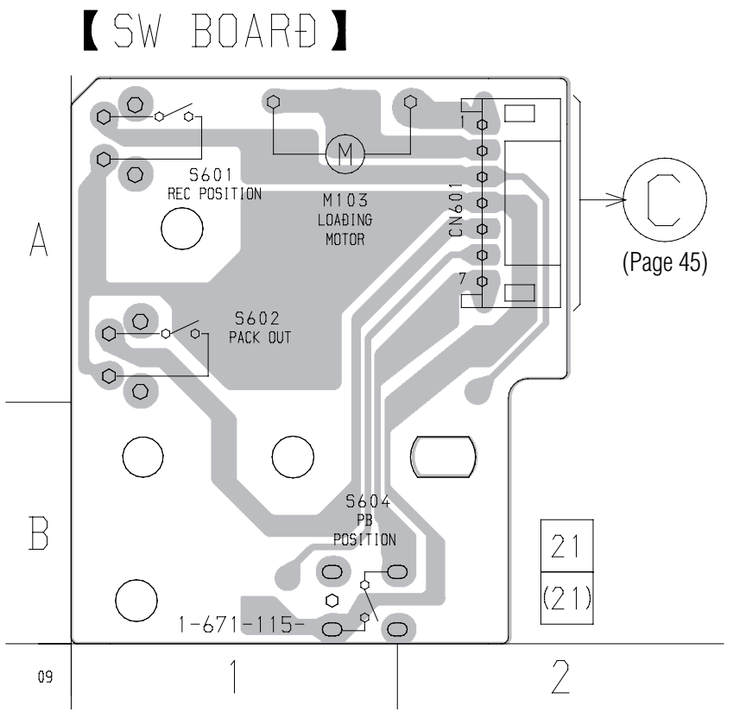


## 6-11. SCHEMATIC DIAGRAM – BD SWITCH SECTION –




## 6-12. PRINTED WIRING BOARD – BD SWITCH SECTION –

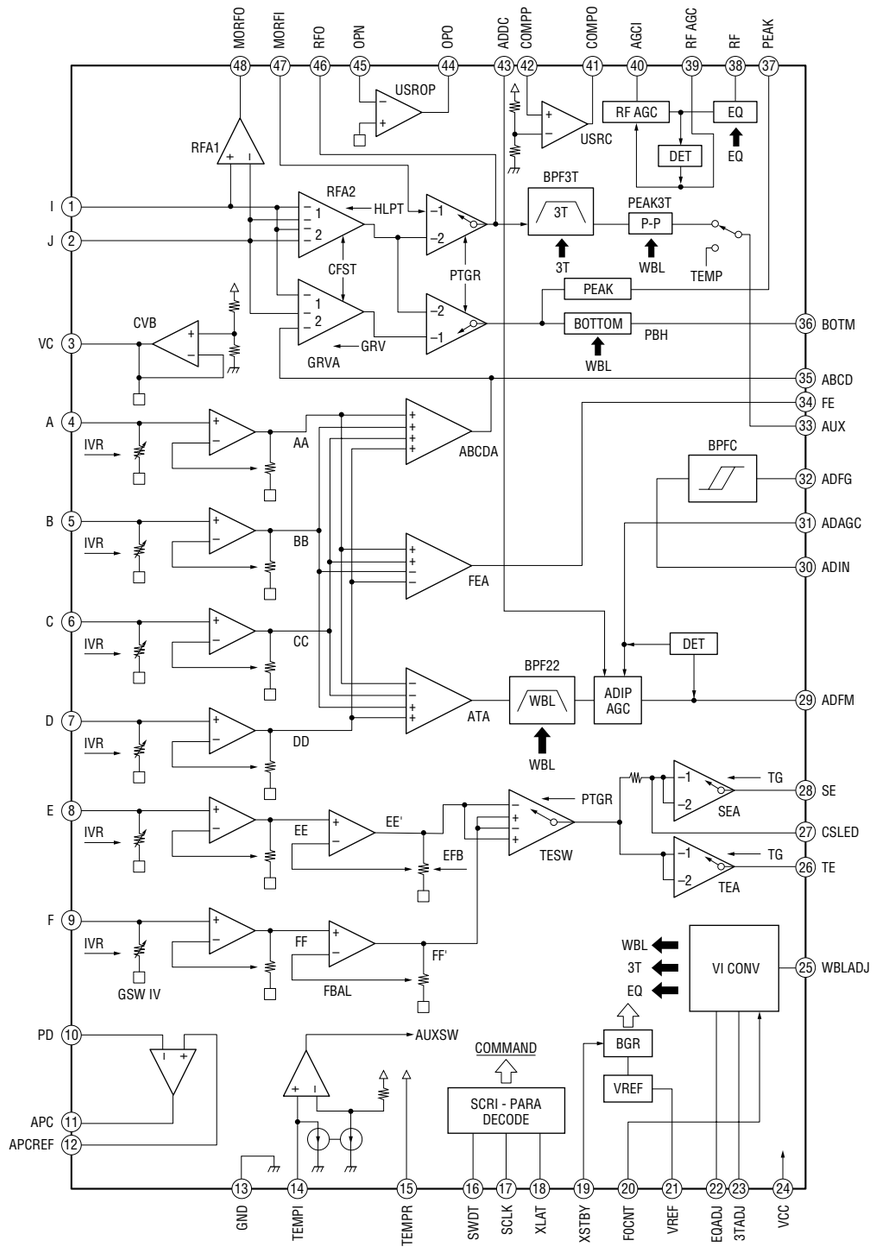
**• See page 28 for Circuit Boards Location.**



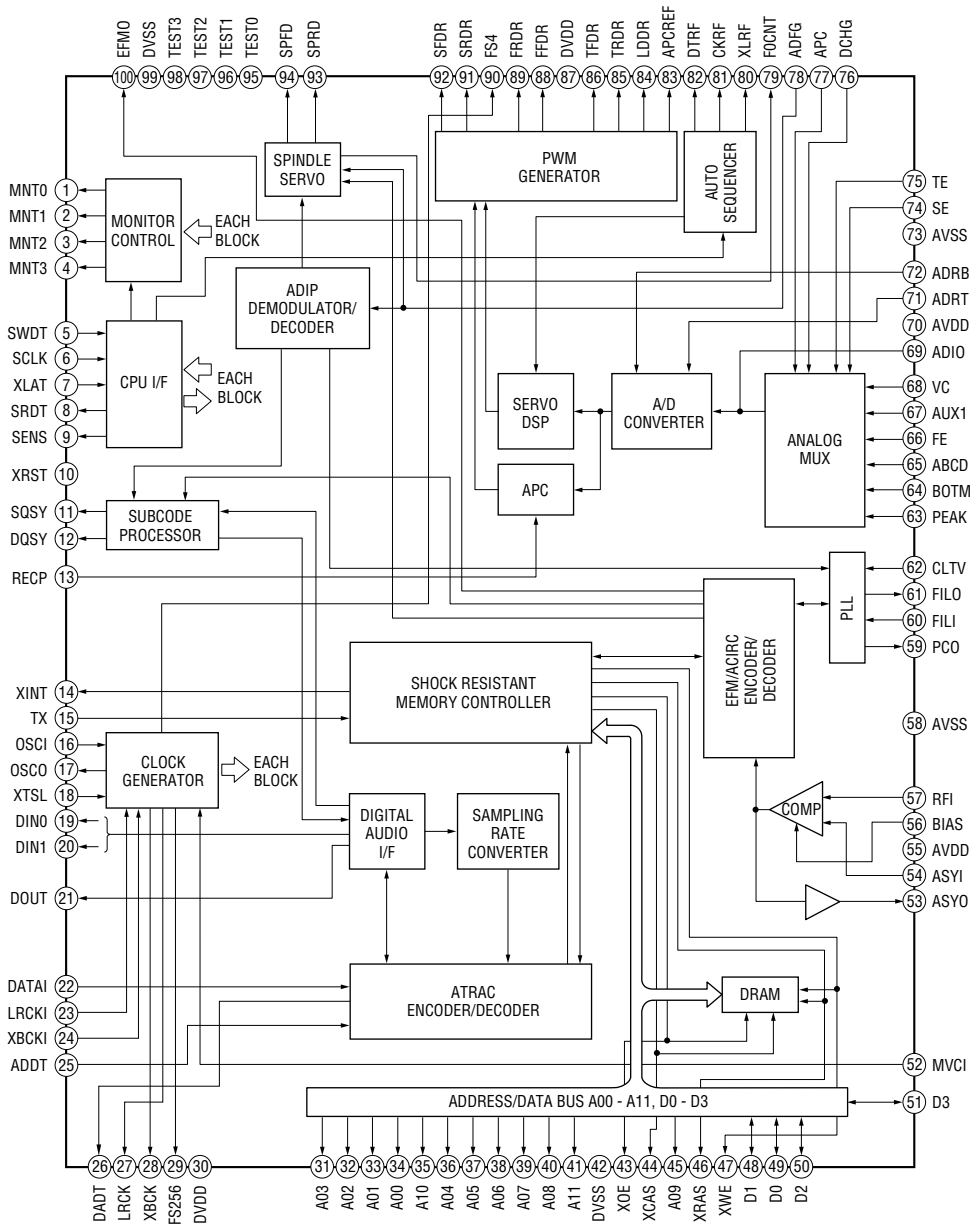

## 6-13. IC BLOCK DIAGRAMS

**– BD Section –**

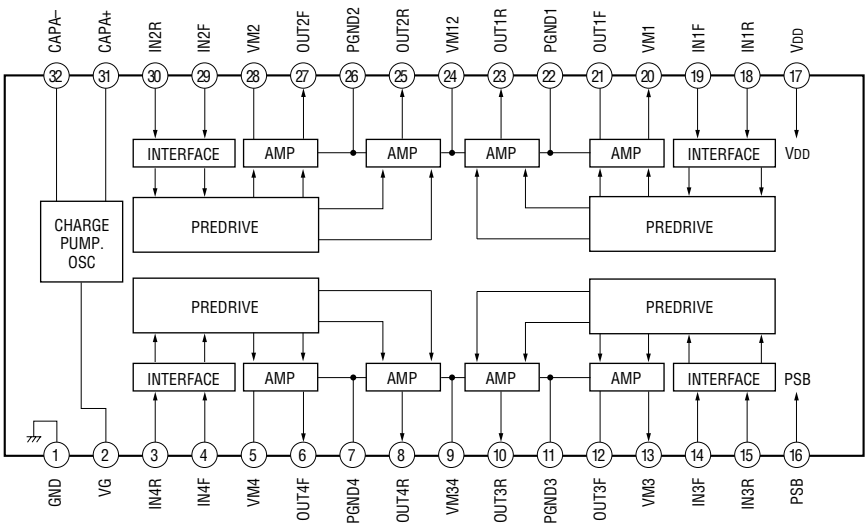
**IC101 CXA2523AR**



**IC121 CXD2654R**

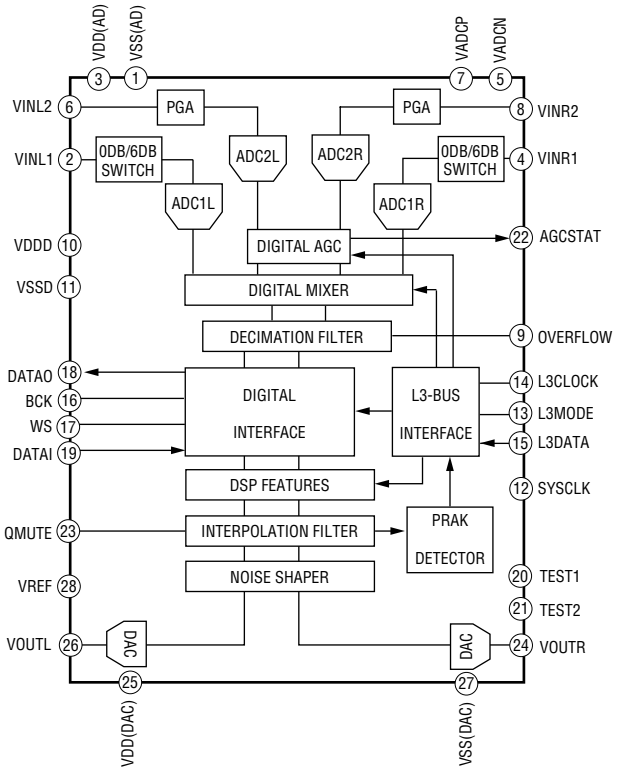



**IC152 BH6511FS-E2**

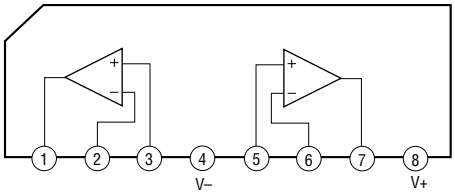


• **MAIN section**

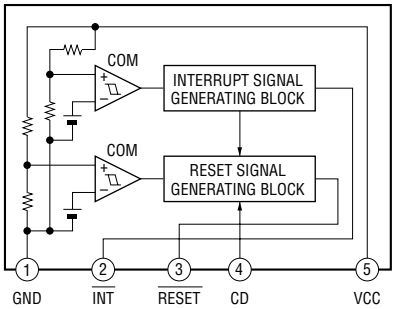
**IC301 UDA1341TS/N2**



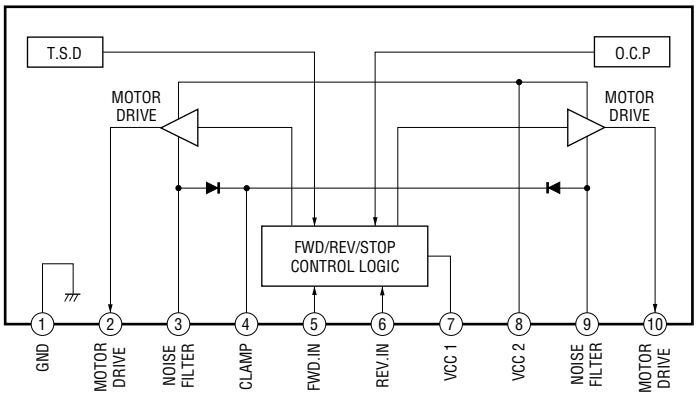

**IC381 M5218AL**




**IC406 M62016L**




**IC441 LB1641**



## 6-14. IC PIN FUNCTIONS

**• IC101 RF Amplifier (CXA2523AR) (BD board)**

| Pin No. | Pin Name | I/O | Function |
|---|---|---|---|
| 1 | I | I | I-V converted RF signal I input |
| 2 | J | I | I-V converted RF signal J input |
| 3 | VC | O | Middle point voltage (+1.5V) generation output |
| 4 to 9 | A to F | I | Signal input from the optical pick-up detector |
| 10 | PD | I | Light amount monitor input |
| 11 | APC | O | Laser APC output |
| 12 | APCREF | I | Reference voltage input for setting laser power |
| 13 | GND | — | Ground |
| 14 | TEMPI | I | Temperature sensor connection |
| 15 | TEMPR | O | Reference voltage output for the temperature sensor |
| 16 | SWDT | I | Serial data input from the CXD2650R or CXD2652AR |
| 17 | SCLK | I | Serial clock input from the CXD2650R or CXD2652AR |
| 18 | XLAT | I | Latch signal input from the CXD2650R or CXD2652AR "L": Latch |
| 19 | XSTBY | I | Stand by signal input "L": Stand by |
| 20 | F0CNT | I | Center frequency control voltage input of BPF22, BPF3T, EQ from the CXD2650R or CXD2652AR |
| 21 | VREF | O | Reference voltage output (Not used) |
| 22 | EQADJ | I/O | Center frequency setting pin for the internal circuit EQ |
| 23 | 3TADJ | I/O | Center frequency setting pin for the internal circuit BPF3T |
| 24 | Vcc | — | +3V power supply |
| 25 | WBLADJ | I/O | Center frequency setting pin for the internal circuit BPF22 |
| 26 | TE | O | Tracking error signal output to the CXD2650R or CXD2652AR |
| 27 | CSLED | — | External capacitor connection pin for the sled error signal LPF |
| 28 | SE | O | Sled error signal output to the CXD2650R or CXD2652AR |
| 29 | ADFM | O | FM signal output of ADIP |
| 30 | ADIN | I | ADIP signal comparator input ADFM is connected with AC coupling |
| 31 | ADAGC | — | External capacitor connection pin for AGC of ADIP |
| 32 | ADFG | O | ADIP duplex signal output to the CXD2650R or CXD2652AR |
| 33 | AUX | O | $I_3$ signal/temperature signal output to the CXD2650R or CXD2652AR (Switching with a serial command) |
| 34 | FE | O | Focus error signal output to the CXD2650R or CXD2652AR |
| 35 | ABCD | O | Light amount signal output to the CXD2650R or CXD2652AR |
| 36 | BOTM | O | RF/ABCD bottom hold signal output to the CXD2650R or CXD2652AR |
| 37 | PEAK | O | RF/ABCD peak hold signal output to the CXD2650R or CXD2652AR |
| 38 | RF | O | RF equalizer output to the CXD2650R or CXD2652AR |
| 39 | RFAGC | — | External capacitor connection pin for the RF AGC circuit |
| 40 | AGCI | I | Input to the RF AGC circuit The RF amplifier output is input with AC coupling |
| 41 | COMPO | O | User comparator output (Not used) |
| 42 | COMPP | I | User comparator input (Fixed at "L") |
| 43 | ADDC | I/O | External capacitor pin for cutting the low band of the ADIP amplifier |
| 44 | OPO | O | User operation amplifier output (Not used) |
| 45 | OPN | I | User operation amplifier inversion input (Fixed at "L") |
| 46 | RFO | O | RF amplifier output |
| 47 | MORFI | I | Groove RF signal is input with AC coupling |
| 48 | MORFO | O | Groove RF signal output |

• Abbreviation
APC: Auto Power Control
AGC: Auto Gain Control

• **IC121 Digital Signal Processor, Digital Servo Signal Processor, EFM/ACIRC Encoder/Decoder, Shock-proof Memory Controller, ATRAC Encoder/Decoder, 2M Bit DRAM (CXD2654R) (BD board)**

| Pin No. | Pin Name | I/O | Function |
|---|---|---|---|
| 1 | MNT0 (FOK) | O | FOK signal output to the system control (monitor output)<br>"H" is output when focus is on |
| 2 | MNT1 (SHCK) | O | Track jump detection signal output to the system control (monitor output) |
| 3 | MNT2 (XBUSY) | O | Monitor 2 output to the system control (monitor output) |
| 4 | MNT3 (SLOC) | O | Monitor 3 output to the system control (monitor output) |
| 5 | SWDT | I | Writing data signal input from the system control |
| 6 | SCLK | I (S) | Serial clock signal input from the system control |
| 7 | XLAT | I (S) | Serial latch signal input from the system control |
| 8 | SRDT | O (3) | Reading data signal output to the system control |
| 9 | SENS | O (3) | Internal status (SENSE) output to the system control |
| 10 | XRST | I (S) | Reset signal input from the system control "L": Reset |
| 11 | SQSY | O | Subcode Q sync (SCOR) output to the system control<br>"L" is output every 13.3 msec. Almost all, "H" is output |
| 12 | DQSY | O | Digital In U-bit CD format or MD format subcode Q sync (SCOR) output to the system control |
| 13 | RECP | I | Laser power switching input from the system control "H": Recording, "L": Playback |
| 14 | XINT | O | Interrupt status output to the system control |
| 15 | TX | I | Recording data output enable input from the system control |
| 16 | OSCI | I | System clock input (512Fs=22.5792 MHz) |
| 17 | OSCO | O | System clock output (512Fs=22.5792 MHz) (Not used) |
| 18 | XTSL | I | System clock frequency setting "L": 45.1584 MHz, "H": 22.5792 MHz (Fixed at "H") |
| 19 | DIN0 | I | Digital audio input (Optical input) |
| 20 | DIN1 | I | Digital audio input (Optical input) |
| 21 | DOUT | O | Digital audio output (Optical output) |
| 22 | DADTI | I | Serial data input |
| 23 | LRCKI | I | LR clock input "H" : Lch, "L" : R ch |
| 24 | XBCKI | I | Serial data clock input |
| 25 | ADDT | I | Data input from the A/D converter |
| 26 | DADT | O | Data output to the D/A converter |
| 27 | LRCK | O | LR clock output for the A/D and D/A converter (44.1 kHz) |
| 28 | XBCK | O | Bit clock output to the A/D and D/A converter (2.8224 MHz) |
| 29 | FS256 | O | 11.2896 MHz clock output (Not used) |
| 30 | DVDD | — | +3V power supply (Digital) |
| 31 to 34 | A03 to A00 | O | DRAM address output |
| 35 | A10 | O | DRAM address output (Not used) |
| 36 to 40 | A04 to A08 | O | DRAM address output |
| 41 | A11 | O | DRAM address output (Not used) |
| 42 | DVSS | — | Ground (Digital) |
| 43 | XOE | O | Output enable output for DRAM |
| 44 | XCAS | O | $\overline{\text{CAS}}$ signal output for DRAM |
| 45 | A09 | O | Address output for DRAM |
| 46 | XRAS | O | $\overline{\text{RAS}}$ signal output for DRAM |
| 47 | XWE | O | Write enable signal output for DRAM (Used : CXD2652AR, Not used : CXD2650R) |

* I (S) stands for Schmidt input, I (A) for analog input, O (3) for 3-state output, and O (A) for analog output in the column I/O

| Pin No. | Pin Name | I/O | Function |
|---|---|---|---|
| 48 | D1 | I/O | Data input/output for DRAM |
| 49 | D0 | I/O | |
| 50, 51 | D2, D3 | I/O | |
| 52 | MVCI | I (S) | Clock input from an external VCO (Fixed at “L”) |
| 53 | ASYO | O | Playback EFM duplex signal output |
| 54 | ASYI | I (A) | Playback EFM comparator slice level input |
| 55 | AVDD | — | +3V power supply (Analog) |
| 56 | BIAS | I (A) | Playback EFM comparator bias current input |
| 57 | RFI | I (A) | Playback EFM RF signal input |
| 58 | AVSS | — | Ground (Analog) |
| 59 | PCO | O (3) | Phase comparison output for the recording/playback EFM master PLL |
| 60 | FILI | I (A) | Filter input for the recording/playback EFM master PLL |
| 61 | FILO | O (A) | Filter output for the recording/playback EFM master PLL |
| 62 | CLTV | I (A) | Internal VCO control voltage input for the recording/playback EFM master PLL |
| 63 | PEAK | I (A) | Light amount signal peak hold input from the CXA2523R |
| 64 | BOTM | I (A) | Light amount signal bottom hold input from the CXA2523R |
| 65 | ABCD | I (A) | Light amount signal input from the CXA2523R |
| 66 | FE | I (A) | Focus error signal input from the CXA2523R |
| 67 | AUX1 | I (A) | Auxiliary A/D input |
| 68 | VC | I (A) | Middle point voltage (+1.5V) input from the CXA2523R |
| 69 | ADIO | O (A) | Monitor output of the A/D converter input signal (Not used) |
| 70 | AVDD | — | +3V power supply (Analog) |
| 71 | ADRT | I (A) | A/D converter operational range upper limit voltage input (Fixed at “H”) |
| 72 | ADRB | I (A) | A/D converter operational range lower limit voltage input (Fixed at “L”) |
| 73 | AVSS | — | Ground (Analog) |
| 74 | SE | I (A) | Sled error signal input from the CXA2523R |
| 75 | TE | I (A) | Tracking error signal input from the CXA2523R |
| 76 | DCHG | I (A) | Connected to +3V power supply |
| 77 | APC | I (A) | Error signal input for the laser digital APC (Fixed at “L”) |
| 78 | ADFG | I (S) | ADIP duplex FM signal input from the CXA2523R (22.05 ± 1 kHz) |
| 79 | F0CNT | O | Filter $f_0$ control output to the CXA2523R |
| 80 | XLRF | O | Control latch output to the CXA2523R |
| 81 | CKRF | O | Control clock output to the CXA2523R |
| 82 | DTRF | O | Control data output to the CXA2523R |
| 83 | APCREF | O | Reference PWM output for the laser APC |
| 84 | TEST0 | O | PWM output for the laser digital APC (Not used) |
| 85 | TRDR | O | Tracking servo drive PWM output (–) |

• Abbreviation
EFM: Eight to Fourteen Modulation
PLL : Phase Locked Loop
VCO: Voltage Controlled Oscillator

| Pin No. | Pin Name | I/O | Function |
|---|---|---|---|
| 86 | TFDR | O | Tracking servo drive PWM output (+) |
| 87 | DVDD | — | +3V power supply (Digital) |
| 88 | FFDR | O | Focus servo drive PWM output (+) |
| 89 | FRDR | O | Focus servo drive PWM output (–) |
| 90 | FS4 | O | 176.4 kHz clock signal output (X'tal) (Not used) |
| 91 | SRDR | O | Sled servo drive PWM output (–) |
| 92 | SFDR | O | Sled servo drive PWM output (+) |
| 93 | SPRD | O | Spindle servo drive PWM output (–) |
| 94 | SPFD | O | Spindle servo drive PWM output (+) |
| 95 | FGIN | I (S) | Test input (Fixed at "L") |
| 96 to 98 | TEST1 to TEST3 | I | |
| 99 | DVSS | — | Ground (Digital) |
| 100 | EFMO | O | EFM output when recording |

• Abbreviation
EFM: Eight to Fourteen Modulation

**• IC501 System Control (M30620MC-400FP) (MAIN board)**

| Pin No. | Pin Name | I/O | Function |
|---|---|---|---|
| 1, 2 | NC | O | Not used (Fixed at “L”) |
| 3 | C1ER | O | C1 error rate voltage output (Fixed at “L”) |
| 4 | ADER | O | AD error rate voltage output (Fixed at “L”) |
| 5 | SQSY | I | ADIP sync or subcode Q sync input from CXD2654R |
| 6 | RMC | I | Remote controls |
| 7 | A1 IN | I | A1 Control input (Fixed at “L”) |
| 8 | BYTE | I | Data bus changed input (Fixed at “L”) |
| 9 | CNVSS | — | Ground |
| 10 | XIN-T | O | Not used (Fixed at “L”) |
| 11 | XOUT-T | O | Not used (Fixed at “L”) |
| 12 | S.RST | I | System rest input |
| 13 | XOUT | O | Main clock output (7.0MHz) |
| 14 | GND | — | Ground |
| 15 | XIN | I | Main clock input (7.0MHz) |
| 16 | +3.3V | — | +3.3V power supply |
| 17 | NMI | I | (Fixed at “H”) |
| 18 | DQSY | I | Digital in sync input |
| 19 | P.DOWN | I | Power down detection input “L”: Power down |
| 20 | KEYBOARD CLK | O | Not used |
| 21 | KEYBOARD DATA | O | Not used |
| 22 | BEEP OUT | — | Not used |
| 23 | XINIT | I | Interrupt status input from CXD2654R |
| 24 to 27 | NC | O | Not used |
| 28 | L3 CLOCK | O | Serial clock signal output to IC301 |
| 29 | NC | O | Not used |
| 30 | LC DATA | O | Serial data signal output to IC301 |
| 31 | SWDT | O | Writing data signal output to the serial bus |
| 32 | SRDT | I | Reading data signal input from the serial bus |
| 33 | SCLK | O | Clock signal output to the serial bus |
| 34 | FLCS | O | Chip select signal output to the display driver |
| 35 | FLDATA | O | Serial data signal output to the display driver |
| 36 | NC | O | Not used (Fixed at “L”) |
| 37 | FLCLK | O | Serial clock signal output to the display driver |
| 38 to 41 | NC | O | Not used |
| 42, 43 | JOG1, JOG0 | I | Jog dial pulse input from the rotary encoder |
| 44 | NC | O | Not used |
| 45 | A1 OUT | O | A1 output |
| 46 | NC | O | Not used |
| 47 | L3 MODE | O | Serial mode signal output to IC301 |
| 48 | DA.RST | O | Not used  Reset: “L” |
| 49 | MUTE | O | DA line out muting output  Mute: “L” |
| 50 | STB | O | Strobe signal output to the power supply circuit  Power supply ON: “H”, stand by: “L” |
| 51 | CHACK IN | I | Detection input from the chucking-in switch  “L”: Chucking |
| 52 | NC | I | Not used (Fixed at “L”) |
| 53 | PACK-OUT | I | Detection input from the loading out switch. Loaded out position: “L”, Others: “H” |
| 54 | LDIN | I | Loading motor control input |
| 55 | LDOUT | O | Loading motor control output |
| 56 | LD-LOW | O | Loading motor voltage control output  Low voltage: “H” |
| 57, 58 | NC | O | Not used (Fixed at “L”) |
| 59 | REC-P | I | Detection signal input from the recording position detection switch |

| Pin No. | Pin Name | I/O | Function |
|---|---|---|---|
| 60 | PB-P | I | Detection signal input from the playback position detection switch |
| 61 | REC/PB | O | Not used Write: “H” |
| 62 | +3.3V | — | +3.3V power supply |
| 63 | NC | O | Not used (Fixed at “L”) |
| 64 | GND | — | Ground |
| 65 | SDA | I/O | Data signal input/output pin with the backup memory |
| 66 | MNT3 (SLOCK) | I | In the state of spindle srvo lock from the CXD2564R |
| 67 | WR PWR | O | Write power ON/OFF output |
| 68 | PROTECT | I | Recording-protection claw detection input from the protection detection switch<br>Protect: “H” |
| 69 | REFLECT | I | Disk reflection rate detection input from the reflect detection switch<br>Disk with low reflection rate: “H” |
| 70 | LDON | O | Laser ON/OFF control output “H”: Laser ON |
| 71 | SENS | I | Internal status (SENSE) input from the CXD2654R |
| 72 | NMT1 (SHOCK) | I | Track jump signal input from the CXD2654R |
| 73 | DIG-RST | O | Digital rest signal output to the CXD2654R and motor driver Reset: “L” |
| 74 | MNT2 (XBUSY) | I | In the state of executive command from the CXD2654R |
| 75 | XLATCH | O | Latch signal output to the serial bus |
| 76 | MOD | O | Laser modulation switching signal output |
| 77 | LIMIT-IN | I | Detection input from the limit switch<br>Sled limit-In: “L” |
| 78 | MNT0 (FOK) | I | Focus OK signal input from the CXD26504R<br>“H” is input when focus is on |
| 79 | SCL | O | Clock signal output to the backup memory |
| 80 | SCTX | O | Writing data transmission timing output to the CXD2654R<br>Shared with the magnetic head ON/OFF output |
| 81 | CLKSET0 | I | Clock destination select pin US, Canadian: “L”, Except US, Canadian :“H” |
| 82 | CLKSET1 | I | Clock destination select pin US, Canadian: “H”, Except US, Canadian :“L” |
| 83 | LED0 | O | Not used |
| 84 | LED1 | O | |
| 85 | OPT DEL | O | |
| 86 | OPT SEL | O | |
| 87 | MODE SEL 0 | I | Mode selector |
| 88 | MODE SEL 1 | O | Not used |
| 89 | $\overline{\text{REC}}$ | O | |
| 90 | BEEP SW | O | |
| 91 | NC | I | |
| 92 | SOURCE | I | Input source change input (A/D input) |
| 93 to 95 | KEY 3 to KEY 1 | I | Key input pin (A/D input) |
| 96 | AVSS | — | Ground (Analog) |
| 97 | KEY0 | I | Key input pin (A/D input) |
| 98 | VREF | — | A/D reference voltage (Fixed at “H”) |
| 99 | +3.3V | — | +3.3V power supply |
| 100 | MONO/ST | I | Monaural, stereo change input Monaural: “H” |

# SECTION 7
# EXPLODED VIEWS

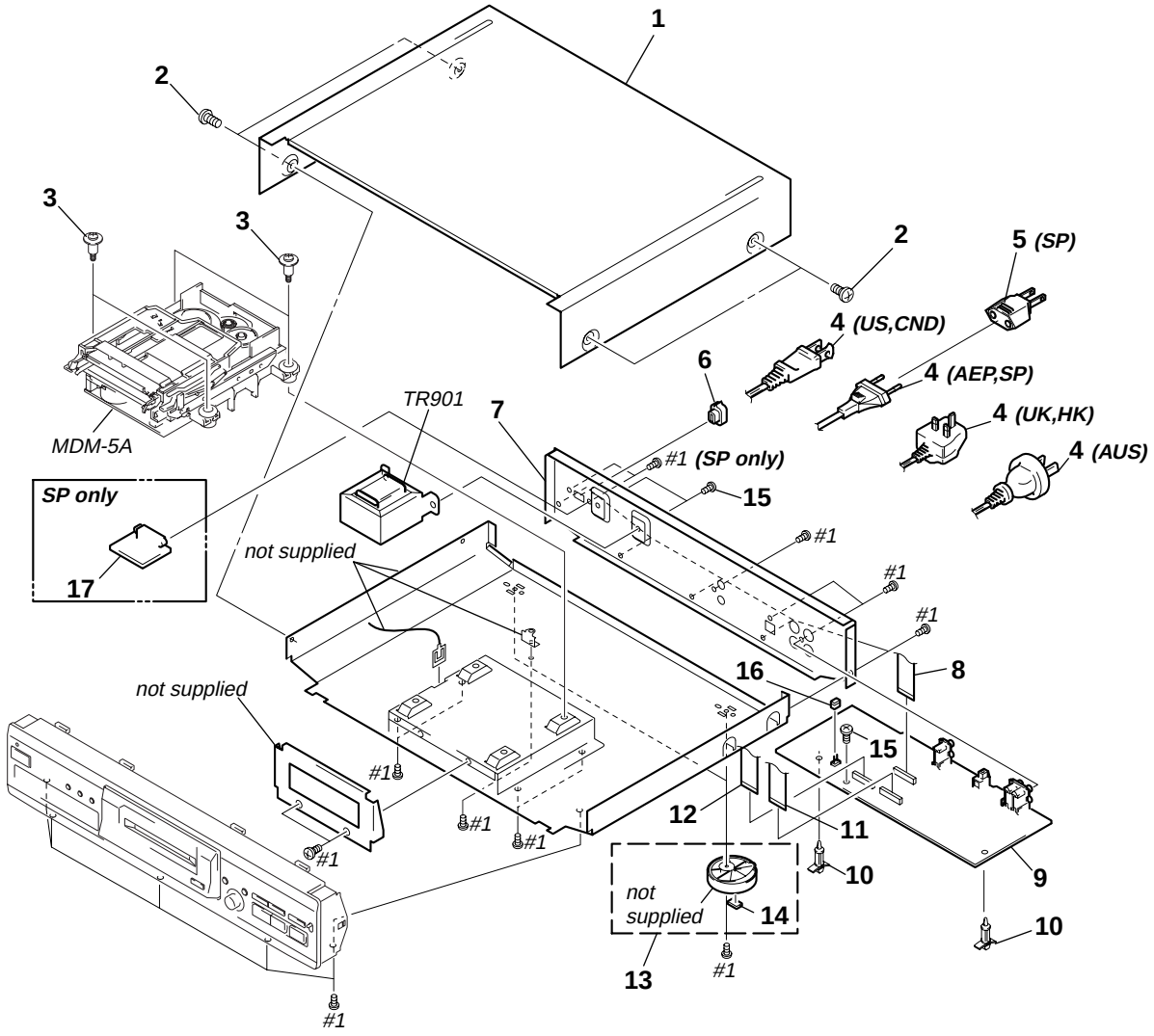
NOTE:
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of this parts list.

- Abbreviation
  CND : Canadian model
  HK : Hong Kong model
  SP : Singapore model
  AUS : Australian model

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une piéce portant le numéro spécifié.

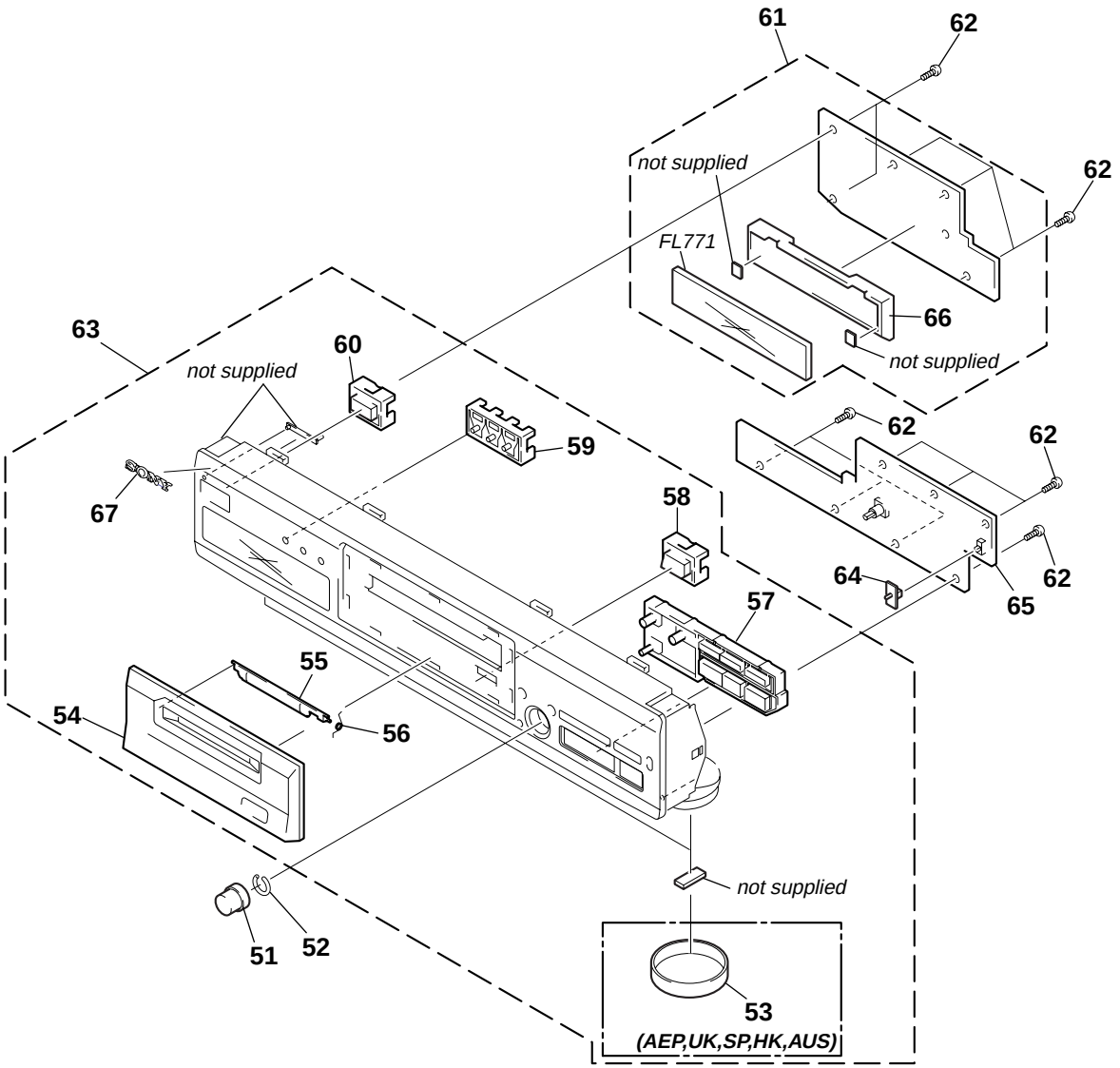
## 7-1. CASE AND BACK PANEL SECTION




| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| 1 | 4-983-661-01 | CASE (408226) | |
| 2 | 4-210-291-01 | SCREW (CASE 3 TP2) | |
| 3 | 4-999-839-11 | SCREW (+BVTTWH M3), STEP | |
| ⚠4 | 1-696-586-21 | CORD, POWER (UK,HK) | |
| ⚠4 | 1-696-846-21 | CORD, POWER (AUS) | |
| ⚠4 | 1-751-275-11 | CORD, POWER (AEP,SP) | |
| ⚠4 | 1-783-531-31 | CORD, POWER (US,CND) | |
| 5 | 1-569-008-21 | ADAPTOR, CONVERSION 2P (SP) | |
| * 6 | 3-703-244-00 | BUSHING (2104), CORD | |
| * 7 | 4-216-349-02 | PANEL, BACK (US) | |
| * 7 | 4-216-349-12 | PANEL, BACK (CND) | |
| * 7 | 4-216-349-22 | PANEL, BACK (AEP,UK) | |
| * 7 | 4-216-349-32 | PANEL, BACK (AUS) | |
| * 7 | 4-216-349-42 | PANEL, BACK (SP) | |
| * 7 | 4-216-349-52 | PANEL, BACK (HK) | |

| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| 8 | 1-790-509-11 | WIRE (FLAT TYPE) (17 CORE) | |
| * 9 | A-4724-608-A | MAIN BOARD, COMPLETE (US,CND) | |
| * 9 | A-4724-611-A | MAIN BOARD, COMPLETE (AEP,UK,HK,AUS) | |
| * 9 | A-4724-614-A | MAIN BOARD, COMPLETE (SP) | |
| * 10 | 4-954-051-51 | HOLDER, PC BOARD | |
| 11 | 1-783-140-11 | WIRE (FLAT TYPE) (23 CORE) | |
| 12 | 1-783-139-11 | WIRE (FLAT TYPE) (21 CORE) | |
| 13 | X-4947-207-1 | FOOT ASSY (F50150S)(AEP,UK,SP,HK,AUS) | |
| 13 | X-4947-208-1 | FOOT ASSY (F50150S)(US,CND) | |
| 14 | 4-977-358-11 | CUSHION (US,CND) | |
| 15 | 4-886-821-11 | SCREW, S TIGHT, +PTTWH 3X6 | |
| 16 | 1-569-972-21 | SOCKET, SHORT 2P | |
| * 17 | 1-672-977-11 | VOL SEL BOARD (SP) | |
| ⚠TR901 | 1-433-693-11 | TRANSFORMER, POWER (US,CND) | |
| ⚠TR901 | 1-433-694-11 | TRANSFORMER, POWER (AEP,UK,HK,AUS) | |
| ⚠TR901 | 1-433-695-11 | TRANSFORMER, POWER (SP) | |

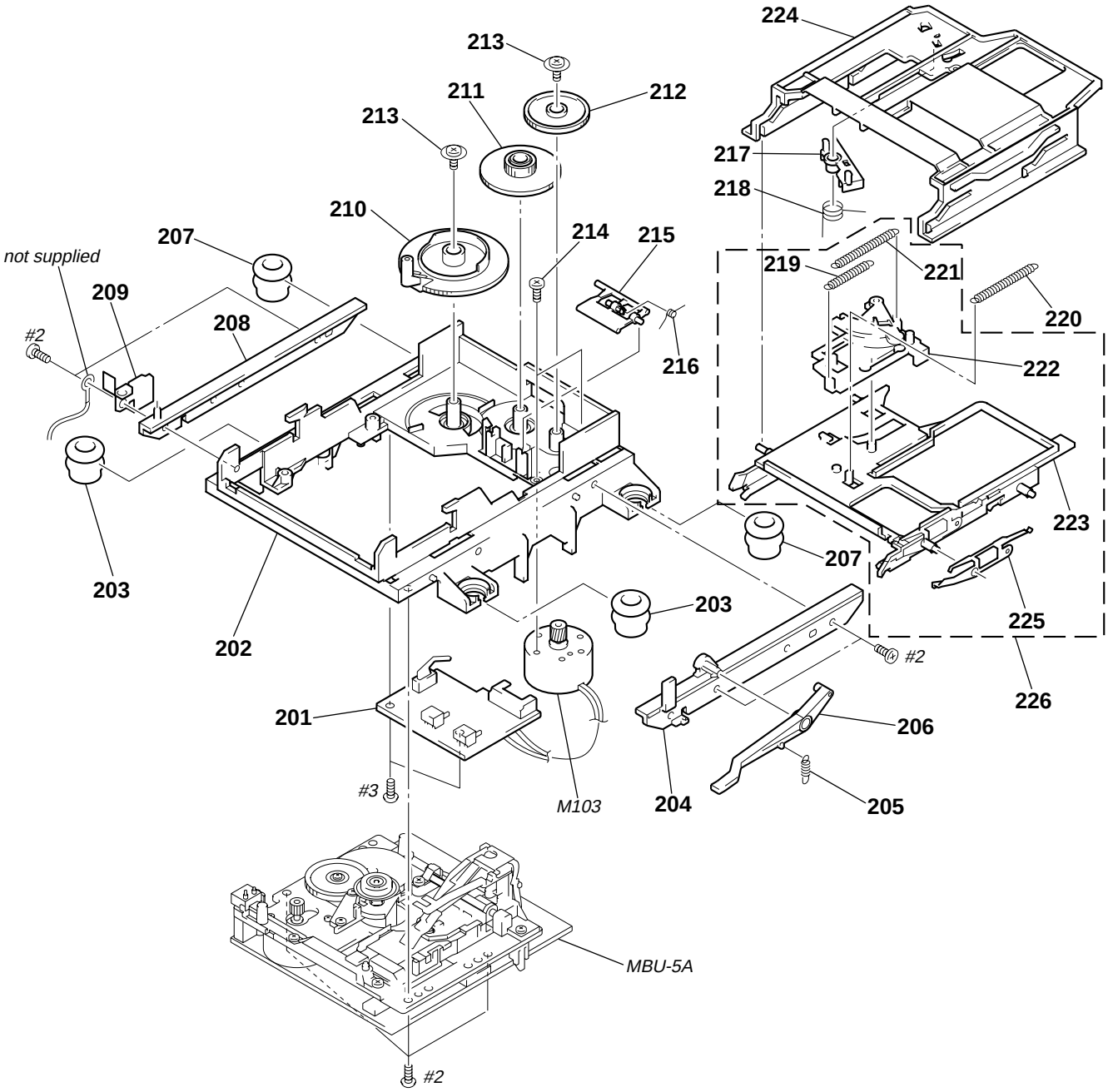
## 7-2. FRONT PANEL SECTION




| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| 51 | 4-996-687-51 | KNOB (AMS) | |
| 52 | 3-354-981-11 | SPRING (SUS), RING | |
| 53 | 4-977-593-11 | RING (DIA. 50), ORNAMENTAL | (AEP,UK,SP,HK,AUS) |
| 54 | 4-216-342-01 | ESCUTCHEON | |
| 55 | 4-996-690-12 | LID (CARTRIDGE) | |
| 56 | 4-976-593-11 | SPRING (LID), TORSION | |
| 57 | 4-216-343-01 | BUTTON (FUNCTION) | |
| 58 | 4-216-346-01 | BUTTON (EJECT) | |
| 59 | 4-216-345-01 | BUTTON (SUB) | |
| 60 | 4-216-344-01 | BUTTON (POWER) | |
| * 61 | A-4724-610-A | DISPLAY BOARD, COMPLETE (US,CND) | |

| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| * 61 | A-4724-613-A | DISPLAY BOARD, COMPLETE (AEP,UK,HK,AUS) | |
| * 61 | A-4724-616-A | DISPLAY BOARD, COMPLETE (SP) | |
| 62 | 4-951-620-01 | SCREW (2.6X8), +BVTP | |
| 63 | X-4951-023-1 | PANEL ASSY, FRONT (US,CND) | |
| 63 | X-4951-024-1 | PANEL ASSY, FRONT (AEP,UK,SP,HK,AUS) | |
| 64 | 4-998-595-01 | KNOB (SLIDE) | |
| * 65 | A-4724-609-A | KEY SW BOARD, COMPLETE (US,CND) | |
| * 65 | A-4724-612-A | KEY SW BOARD, COMPLETE (AEP,UK,HK,AUS) | |
| * 65 | A-4724-615-A | KEY SW BOARD, COMPLETE (SP) | |
| * 66 | 4-216-341-01 | HOLDER (FL) | |
| 67 | 4-996-698-01 | EMBLEM, SONY | |
| FL771 | 1-517-865-11 | INDICATOR TUBE, FLUORESCENT | |

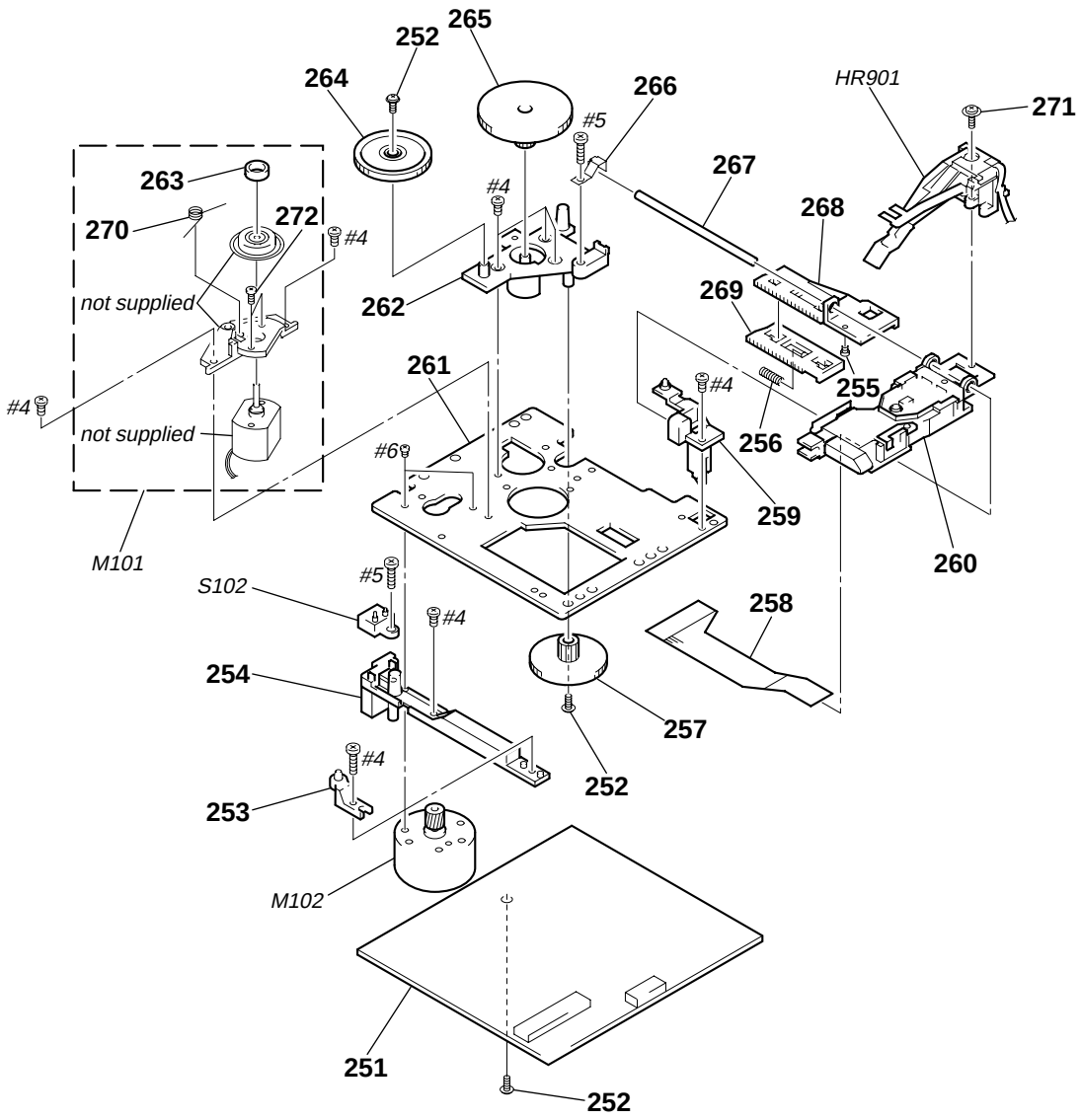
## 7-3. MECHANISM SECTION (MDM-5A)




| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| * 201 | 1-671-115-21 | SW BOARD | |
| * 202 | 4-996-217-01 | CHASSIS | |
| 203 | 4-996-223-11 | INSULATOR (F) | |
| * 204 | 4-996-218-01 | BRACKET (GUIDE R) | |
| 205 | 4-996-277-01 | SPRING (O/C), TENSION | |
| 206 | 4-996-226-01 | LEVER (O/C) | |
| 207 | 4-999-347-01 | INSULATOR (R) | |
| * 208 | 4-996-225-01 | BRACKET (GUIDE L) | |
| 209 | 4-988-466-11 | SPRING (ELECTROSTATIC), LEAF | |
| 210 | 4-996-219-01 | GEAR (CAM GEAR) | |
| 211 | 4-996-220-01 | GEAR (A) | |
| 212 | 4-996-221-01 | GEAR (B) | |
| 213 | 4-933-134-01 | SCREW (+PTPWH M2.6X6) | |
| 214 | 4-996-224-01 | SCREW (1.7X3), +PWH | |

| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| 215 | 4-996-227-01 | LEVER (HEAD) | |
| 216 | 4-996-229-01 | SPRING (HEAD LEVER), TORSION | |
| 217 | 4-996-212-01 | LEVER (LIMITTER) | |
| 218 | 4-996-213-01 | SPRING (LIMITTER), TORSION | |
| 219 | 4-996-214-01 | SPRING (SLIDER), TENSION | |
| 220 | 4-966-216-01 | SPRING (HOLDER), TENSION | |
| 221 | 4-996-215-11 | SPRING (LOCK LEVER), TENSION | |
| 222 | X-4949-246-1 | SLIDER ASSY | |
| 223 | X-4949-245-1 | HOLDER ASSY | |
| * 224 | 4-996-211-11 | SLIDER (CAM) | |
| 225 | 4-998-763-01 | SPRING (SHUTTER), LEAF | |
| 226 | A-4680-409-A | HOLDER | |
| M103 | X-4949-264-1 | MOTOR ASSY, LOADING | |

## 7-4. BASE UNIT SECTION (MBU-5A)




| The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.<br>Replace only with part number specified. | Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.<br>Ne les remplacer que par une piéce portant le numéro spécifié. |
|---|---|

| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| 251 | A-4699-893-A | BD BOARD, COMPLETE | |
| 252 | 3-372-761-01 | SCREW (M1.7), TAPPING | |
| * 253 | 4-996-267-01 | BASE (BU-D) | |
| * 254 | 4-996-255-01 | BASE (BU-C) | |
| 255 | 4-900-590-01 | SCREW, PRECISION SMALL | |
| 256 | 4-996-258-01 | SPRING, COMPRESSION | |
| 257 | 4-996-262-01 | GEAR (SL-C) | |
| * 258 | 1-667-954-11 | FLEXIBLE BOARD | |
| * 259 | 4-210-664-11 | BASE (BU-A) | |
| ⚠260 | 8-583-028-01 | OPTICAL PICK-UP KMS-260A/K1NP | |
| * 261 | 4-996-252-01 | CHASSIS, BU | |
| * 262 | 4-996-254-01 | BASE (BU-B) | |
| 263 | 4-967-688-11 | MAGNET, ABSORPTION | |
| 264 | 4-996-260-01 | GEAR (SL-A) | |
| 265 | 4-996-261-01 | GEAR (SL-B) | |
| 266 | 4-996-264-01 | SPRING (SHAFT), LEAF | |
| 267 | 4-996-265-01 | SHAFT, MAIN | |
| 268 | 4-996-256-11 | SL (BASE) | |
| 269 | 4-996-257-01 | RACK (SL) | |
| 270 | 4-996-263-01 | SPRING (CLV), TORSION | |
| 271 | 4-988-560-01 | SCREW (+P 1.7X6) | |
| 272 | 4-211-036-01 | SCREW (1.7X2.5), +PWH | |
| HR901 | 1-500-502-11 | HEAD, OVER WRITE | |
| M101 | A-4672-475-A | MOTOR ASSY, SPINDLE | |
| M102 | A-4672-474-A | MOTOR ASSY, SLED | |
| S102 | 1-762-148-21 | SWITCH, PUSH (2 KEY) | |

# SECTION 8
# ELECTRICAL PARTS LIST

BD

Note:

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une piéce portant le numéro spécifié.

When indicating parts by reference number, please include the board name.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- RESISTORS
  All resistors are in ohms
  METAL: Metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F : nonflammable
- SEMICONDUCTORS
  In each case, u: µ , for example:
  uA...: µ A..., uPA...: µ PA..., uPB...: µ PB..., uPC...: µ PC..., uPD...: µ PD...
- CAPACITORS
  uF : µ F
- COILS
  uH : µ H
- Abbreviation
  CND : Canadian model
  HK : Hong Kong model
  SP : Singapore model
  AUS : Australian model

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| | A-4699-893-A | BD BOARD, COMPLETE | | | |
| | | ********** | | | |
| | | < CAPACITOR > | | | |
| C101 | 1-125-822-11 | TANTALUM | 10uF | 20% | 10V |
| C102 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C103 | 1-125-822-11 | TANTALUM | 10uF | 20% | 10V |
| C104 | 1-125-822-11 | TANTALUM | 10uF | 20% | 10V |
| C105 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C106 | 1-163-275-11 | CERAMIC CHIP | 0.001uF | 5% | 50V |
| C107 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C108 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C109 | 1-163-037-11 | CERAMIC CHIP | 0.022uF | 10% | 25V |
| C111 | 1-164-344-11 | CERAMIC CHIP | 0.068uF | 10% | 25V |
| C112 | 1-163-017-00 | CERAMIC CHIP | 0.0047uF | 5% | 50V |
| C113 | 1-109-982-11 | CERAMIC CHIP | 1uF | 10% | 10V |
| C115 | 1-164-489-11 | CERAMIC CHIP | 0.22uF | 10% | 16V |
| C116 | 1-163-037-11 | CERAMIC CHIP | 0.022uF | 10% | 25V |
| C117 | 1-163-809-11 | CERAMIC CHIP | 0.047uF | 10% | 25V |
| C118 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C119 | 1-125-822-11 | TANTALUM | 10uF | 20% | 10V |
| C121 | 1-125-822-11 | TANTALUM | 10uF | 20% | 10V |
| C122 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C123 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C124 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C127 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C128 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C129 | 1-107-823-11 | CERAMIC CHIP | 0.47uF | 10% | 16V |
| C130 | 1-163-251-11 | CERAMIC CHIP | 100PF | 5% | 50V |
| C131 | 1-163-023-00 | CERAMIC CHIP | 0.015uF | 5% | 50V |
| C132 | 1-107-823-11 | CERAMIC CHIP | 0.47uF | 10% | 16V |
| C133 | 1-163-017-00 | CERAMIC CHIP | 0.0047uF | 5% | 50V |
| C134 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C135 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C136 | 1-126-206-11 | ELECT CHIP | 100uF | 20% | 6.3V |
| C142 | 1-163-251-11 | CERAMIC CHIP | 100PF | 5% | 50V |
| C143 | 1-163-251-11 | CERAMIC CHIP | 100PF | 5% | 50V |
| C144 | 1-163-251-11 | CERAMIC CHIP | 100PF | 5% | 50V |
| C146 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C151 | 1-126-206-11 | ELECT CHIP | 100uF | 20% | 6.3V |
| C152 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C153 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C156 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C158 | 1-163-019-00 | CERAMIC CHIP | 0.0068uF | 10% | 50V |
| C160 | 1-104-601-11 | ELECT CHIP | 10uF | 20% | 10V |
| C161 | 1-104-601-11 | ELECT CHIP | 10uF | 20% | 10V |
| C163 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C164 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C167 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C168 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C169 | 1-125-822-11 | TANTALUM | 10uF | 20% | 10V |
| C171 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C181 | 1-104-913-11 | TANTAL. CHIP | 10uF | 20% | 16V |
| C183 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C184 | 1-117-970-11 | ELECT CHIP | 22uF | 20% | 10V |
| C185 | 1-164-611-11 | CERAMIC CHIP | 0.001uF | 10% | 500V |
| C187 | 1-104-913-11 | TANTAL. CHIP | 10uF | 20% | 16V |
| C188 | 1-163-021-91 | CERAMIC CHIP | 0.01uF | 10% | 50V |
| C189 | 1-163-989-11 | CERAMIC CHIP | 0.033uF | 10% | 25V |
| C190 | 1-126-206-11 | ELECT CHIP | 100uF | 20% | 6.3V |
| C191 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C196 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| C197 | 1-163-038-91 | CERAMIC CHIP | 0.1uF | | 25V |
| | | < CONNECTOR > | | | |
| CN101 | 1-569-479-21 | CONNECTOR, FPC 21P | | | |
| CN102 | 1-784-833-21 | CONNECTOR,FFC(LIF(NON-ZIF))21P | | | |
| CN103 | 1-784-834-21 | CONNECTOR,FFC(LIF(NON-ZIF))23P | | | |
| CN104 | 1-770-687-11 | CONNECTOR, FFC/FPC 4P | | | |
| CN110 | 1-695-440-21 | PIN, CONNECTOR (PC BOARD) 6P | | | |
| | | < DIODE > | | | |
| D101 | 8-719-988-61 | DIODE 1SS355TE-17 | | | |
| D181 | 8-719-046-86 | DIODE F1J6TP | | | |
| D183 | 8-719-046-86 | DIODE F1J6TP | | | |
| | | < IC > | | | |
| IC101 | 8-752-080-95 | IC CXA2523AR | | | |
| IC103 | 8-729-903-10 | IC TRANSISTOR FMW1 | | | |
| IC121 | 8-752-389-44 | IC CXD2654R | | | |
| IC123 | 8-759-096-87 | IC TC7WU04FU(TE12R) | | | |
| IC124 | 8-759-498-44 | IC MSM51V4400-70TS-K | | | |
| IC152 | 8-759-430-25 | IC BH6511FS-E2 | | | |
| IC171 | 8-759-487-04 | IC BR24C02F-E2 | | | |
| IC181 | 8-759-481-17 | IC MC74ACT08DTR2 | | | |
| IC192 | 8-759-460-72 | IC BA033FP-E2 | | | |
| | | < COIL > | | | |
| L101 | 1-414-813-11 | FERRITE | 0uH | | |
| L102 | 1-414-813-11 | FERRITE | 0uH | | |
| L103 | 1-414-813-11 | FERRITE | 0uH | | |
| L105 | 1-414-813-11 | FERRITE | 0uH | | |
| L106 | 1-414-813-11 | FERRITE | 0uH | | |

## BD DISPLAY

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| L121 | 1-414-813-11 | FERRITE | 0uH | | |
| L122 | 1-414-813-11 | FERRITE | 0uH | | |
| L151 | 1-412-029-11 | INDUCTOR CHIP | 10uH | | |
| L152 | 1-412-029-11 | INDUCTOR CHIP | 10uH | | |
| L153 | 1-412-032-11 | INDUCTOR CHIP | 100uH | | |
| L154 | 1-412-032-11 | INDUCTOR CHIP | 100uH | | |
| L161 | 1-414-813-11 | FERRITE | 0uH | | |
| L162 | 1-414-813-11 | FERRITE | 0uH | | |
| L181 | 1-216-295-91 | SHORT | 0 | | |
| | | < TRANSISTOR > | | | |
| Q101 | 8-729-403-35 | TRANSISTOR | UN5113 | | |
| Q102 | 8-729-026-53 | TRANSISTOR | 2SA1576A-T106-QR | | |
| Q103 | 8-729-402-93 | TRANSISTOR | UN5214 | | |
| Q104 | 8-729-402-93 | TRANSISTOR | UN5214 | | |
| Q162 | 8-729-101-07 | TRANSISTOR | 2SB798-DL | | |
| Q163 | 8-729-403-35 | TRANSISTOR | UN5113 | | |
| Q181 | 8-729-018-75 | TRANSISTOR | 2SJ278MY | | |
| Q182 | 8-729-017-65 | TRANSISTOR | 2SK1764KY | | |
| | | < RESISTOR > | | | |
| R103 | 1-216-049-91 | RES,CHIP | 1K | 5% | 1/10W |
| R104 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R105 | 1-216-065-91 | RES,CHIP | 4.7K | 5% | 1/10W |
| R106 | 1-216-133-00 | METAL CHIP | 3.3M | 5% | 1/10W |
| R107 | 1-216-113-00 | METAL CHIP | 470K | 5% | 1/10W |
| R109 | 1-216-295-91 | SHORT | 0 | | |
| R110 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R111 | 1-216-295-91 | SHORT | 0 | | |
| R112 | 1-216-089-91 | RES,CHIP | 47K | 5% | 1/10W |
| R113 | 1-216-049-91 | RES,CHIP | 1K | 5% | 1/10W |
| R115 | 1-216-049-91 | RES,CHIP | 1K | 5% | 1/10W |
| R117 | 1-216-113-00 | METAL CHIP | 470K | 5% | 1/10W |
| R120 | 1-216-025-91 | RES,CHIP | 100 | 5% | 1/10W |
| R121 | 1-216-097-91 | RES,CHIP | 100K | 5% | 1/10W |
| R123 | 1-216-295-91 | SHORT | 0 | | |
| R124 | 1-216-025-91 | RES,CHIP | 100 | 5% | 1/10W |
| R125 | 1-216-025-91 | RES,CHIP | 100 | 5% | 1/10W |
| R127 | 1-216-025-91 | RES,CHIP | 100 | 5% | 1/10W |
| R129 | 1-216-295-91 | SHORT | 0 | | |
| R131 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R132 | 1-216-097-91 | RES,CHIP | 100K | 5% | 1/10W |
| R133 | 1-216-117-00 | METAL CHIP | 680K | 5% | 1/10W |
| R134 | 1-216-049-91 | RES,CHIP | 1K | 5% | 1/10W |
| R135 | 1-216-061-00 | METAL CHIP | 3.3K | 5% | 1/10W |
| R136 | 1-216-049-91 | RES,CHIP | 1K | 5% | 1/10W |
| R137 | 1-216-295-91 | SHORT | 0 | | |
| R140 | 1-216-029-00 | METAL CHIP | 150 | 5% | 1/10W |
| R142 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R143 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R144 | 1-216-025-91 | RES,CHIP | 100 | 5% | 1/10W |
| R145 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R146 | 1-216-037-00 | METAL CHIP | 330 | 5% | 1/10W |
| R147 | 1-216-025-91 | RES,CHIP | 100 | 5% | 1/10W |
| R148 | 1-216-045-00 | METAL CHIP | 680 | 5% | 1/10W |
| R149 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R150 | 1-216-295-91 | SHORT | 0 | | |

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| R151 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R152 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R158 | 1-216-097-91 | RES,CHIP | 100K | 5% | 1/10W |
| R159 | 1-216-097-91 | RES,CHIP | 100K | 5% | 1/10W |
| R160 | 1-216-295-91 | SHORT | 0 | | |
| R161 | 1-216-057-00 | METAL CHIP | 2.2K | 5% | 1/10W |
| R162 | 1-216-057-00 | METAL CHIP | 2.2K | 5% | 1/10W |
| R163 | 1-216-057-00 | METAL CHIP | 2.2K | 5% | 1/10W |
| R164 | 1-216-045-00 | METAL CHIP | 680 | 5% | 1/10W |
| R165 | 1-216-097-91 | RES,CHIP | 100K | 5% | 1/10W |
| R166 | 1-220-149-11 | REGISTER | 2.2 | 10% | 1/2W |
| R167 | 1-216-065-91 | RES,CHIP | 4.7K | 5% | 1/10W |
| R169 | 1-219-724-11 | METAL CHIP | 1 | 1% | 1/4W |
| R170 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R171 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R173 | 1-216-121-91 | RES,CHIP | 1M | 5% | 1/10W |
| R175 | 1-216-065-91 | RES,CHIP | 4.7K | 5% | 1/10W |
| R177 | 1-216-061-00 | METAL CHIP | 3.3K | 5% | 1/10W |
| R179 | 1-216-085-00 | METAL CHIP | 33K | 5% | 1/10W |
| R180 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R182 | 1-216-089-91 | RES,CHIP | 47K | 5% | 1/10W |
| R183 | 1-216-089-91 | RES,CHIP | 47K | 5% | 1/10W |
| R184 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R185 | 1-216-081-00 | METAL CHIP | 22K | 5% | 1/10W |
| R186 | 1-216-089-91 | RES,CHIP | 47K | 5% | 1/10W |
| R188 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R189 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R190 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R195 | 1-216-073-00 | METAL CHIP | 10K | 5% | 1/10W |
| R196 | 1-216-295-91 | SHORT | 0 | | |
| R197 | 1-216-295-91 | SHORT | 0 | | |
| | | < SWITCH > | | | |
| S101 | 1-762-596-21 | SWITCH, PUSH (1 KEY)(LIMIT IN) | | | |

**********

| | | | | | |
|---|---|---|---|---|---|
| * | A-4724-610-A | DISPLAY BOARD, COMPLETE (US,CND) | | | |
| | | ********** | | | |
| * | A-4724-616-A | DISPLAY BOARD, COMPLETE (SP) | | | |
| | | ********** | | | |
| * | A-4724-613-A | DISPLAY BOARD, COMPLETE (AEP,UK,HK,AUS) | | | |
| | | ********** | | | |
| * | 4-216-341-01 | HOLDER (FL) | | | |
| | | < CAPACITOR > | | | |
| C760 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C761 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C762 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C763 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C764 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C765 | 1-126-153-11 | ELECT | 22uF | 20% | 6.3V |
| C766 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C769 | 1-162-215-31 | CERAMIC | 47PF | 5% | 50V |
| C781 | 1-124-584-00 | ELECT | 100uF | 20% | 10V |
| C782 | 1-162-306-11 | CERAMIC | 0.01uF | 20% | 16V |

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| | | < CONNECTOR > | | | |
| CN751 | 1-784-642-11 | CONNECTOR, BOARD TO BOARD 11P | | | |
| | | < DIODE > | | | |
| D751 | 8-719-046-44 | DIODE SEL5221S (STANDBY) | | | |
| | | < FLUORESCENT INDICATOR > | | | |
| FL771 | 1-517-865-11 | INDICATOR TUBE, FLUORESCENT | | | |
| | | < IC > | | | |
| IC761 | 8-759-426-98 | IC MSM9202-02GS-K | | | |
| IC781 | 8-749-013-92 | IC GP1UC7X | | | |
| | | < TRANSISTOR > | | | |
| Q751 | 8-729-422-57 | TRANSISTOR UN4111 | | | |
| Q767 | 8-729-900-74 | TRANSISTOR DTC143TS | | | |
| | | < RESISTOR > | | | |
| R722 | 1-249-421-11 | CARBON | 2.2K | 5% | 1/4W F |
| R723 | 1-247-843-11 | CARBON | 3.3K | 5% | 1/4W |
| R724 | 1-249-425-11 | CARBON | 4.7K | 5% | 1/4W F |
| R725 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W |
| R726 | 1-249-435-11 | CARBON | 33K | 5% | 1/4W |
| R751 | 1-249-409-11 | CARBON | 220 | 5% | 1/4W F |
| R760 | 1-247-807-31 | CARBON | 100 | 5% | 1/4W |
| R761 | 1-247-807-31 | CARBON | 100 | 5% | 1/4W |
| R762 | 1-247-807-31 | CARBON | 100 | 5% | 1/4W |
| R763 | 1-247-807-31 | CARBON | 100 | 5% | 1/4W |
| R767 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W |
| R769 | 1-247-843-11 | CARBON | 3.3K | 5% | 1/4W |
| R781 | 1-249-401-11 | CARBON | 47 | 5% | 1/4W F |
| R782 | 1-247-807-31 | CARBON | 100 | 5% | 1/4W |
| | | < SWITCH > | | | |
| S722 | 1-762-875-21 | SWITCH, KEYBOARD (PLAY MODE) | | | |
| S723 | 1-762-875-21 | SWITCH, KEYBOARD (REPEAT) | | | |
| S725 | 1-762-875-21 | SWITCH, KEYBOARD (LEVEL/DISPLAY/CHAR) | | | |
| S726 | 1-762-875-21 | SWITCH, KEYBOARD (I/⏻) | | | |
| ********** | | | | | |
| * | A-4724-609-A | KEY SW BOARD, COMPLETE (US,CND) | | | |
| | | ********** | | | |
| * | A-4724-612-A | KEY SW BOARD, COMPLETE (AEP,UK,HK,AUS) | | | |
| | | ********** | | | |
| * | A-4724-615-A | KEY SW BOARD, COMPLETE (SP) | | | |
| | | ********** | | | |
| | | < CAPACITOR > | | | |
| C700 | 1-126-153-11 | ELECT | 22uF | 20% | 6.3V |
| | | < CONNECTOR > | | | |
| CN701 | 1-779-554-11 | CONNECTOR,FFC(LIF(NON-ZIF))17P | | | |
| CN731 | 1-784-641-11 | CONNECTOR, BOARD TO BOARD 11P | | | |

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| | | < RESISTOR > | | | |
| R702 | 1-249-421-11 | CARBON | 2.2K | 5% | 1/4W F |
| R703 | 1-247-843-11 | CARBON | 3.3K | 5% | 1/4W |
| R704 | 1-249-425-11 | CARBON | 4.7K | 5% | 1/4W F |
| R705 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W |
| R706 | 1-249-435-11 | CARBON | 33K | 5% | 1/4W |
| R712 | 1-249-421-11 | CARBON | 2.2K | 5% | 1/4W F |
| R713 | 1-247-843-11 | CARBON | 3.3K | 5% | 1/4W |
| R714 | 1-249-425-11 | CARBON | 4.7K | 5% | 1/4W F |
| | | < SWITCH > | | | |
| S701 | 1-762-875-21 | SWITCH, KEYBOARD (●) | | | |
| S702 | 1-762-875-21 | SWITCH, KEYBOARD (■) | | | |
| S703 | 1-762-875-21 | SWITCH, KEYBOARD (▶▶) | | | |
| S704 | 1-762-875-21 | SWITCH, KEYBOARD (◀◀) | | | |
| S705 | 1-762-875-21 | SWITCH, KEYBOARD (❚❚) | | | |
| S706 | 1-762-875-21 | SWITCH, KEYBOARD (▷) | | | |
| S711 | 1-762-875-21 | SWITCH, KEYBOARD (MENU/NO) | | | |
| S712 | 1-762-875-21 | SWITCH, KEYBOARD (YES) | | | |
| S713 | 1-475-543-11 | ENCODER, ROTARY (PUSH ENTER/I◁◁ AMS ▷▷I) | | | |
| S714 | 1-762-875-21 | SWITCH, KEYBOARD (CLEAR) | | | |
| S721 | 1-762-875-21 | SWITCH, KEYBOARD (⏏) | | | |
| S731 | 1-762-404-11 | SWITCH, SLIDE (INPUT DIGITAL/ANALOG) | | | |
| ********** | | | | | |
| * | A-4724-608-A | MAIN BOARD, COMPLETE (US,CND) | | | |
| | | ********** | | | |
| * | A-4724-611-A | MAIN BOARD, COMPLETE (AEP,UK,HK,AUS) | | | |
| | | ********** | | | |
| * | A-4724-614-A | MAIN BOARD, COMPLETE (SP) | | | |
| | | ********** | | | |
| | 7-685-872-09 | SCREW +BVTT 3X8 (S) | | | |
| | | < BATTERY > | | | |
| BT406 | 1-528-887-11 | BATTERY, LITHIUM SECONDARY | | | |
| | | < CAPACITOR > | | | |
| C101 | 1-162-290-31 | CERAMIC | 470PF | 10% | 50V |
| C102 | 1-126-964-11 | ELECT | 10uF | 20% | 50V |
| C181 | 1-128-551-11 | ELECT | 22uF | 20% | 25V |
| C182 | 1-162-600-11 | CERAMIC | 0.0047uF | 30% | 16V |
| C183 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C184 | 1-126-963-11 | ELECT | 4.7uF | 20% | 50V |
| C185 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C201 | 1-162-290-31 | CERAMIC | 470PF | 10% | 50V |
| C202 | 1-126-964-11 | ELECT | 10uF | 20% | 50V |
| C281 | 1-128-551-11 | ELECT | 22uF | 20% | 25V |
| C282 | 1-162-600-11 | CERAMIC | 0.0047uF | 30% | 16V |
| C283 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C284 | 1-126-963-11 | ELECT | 4.7uF | 20% | 50V |
| C285 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C300 | 1-126-934-11 | ELECT | 220uF | 20% | 10V |
| C301 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |

## MAIN

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| C302 | 1-126-934-11 | ELECT | 220uF | 20% | 10V |
| C303 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C304 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C305 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C306 | 1-126-934-11 | ELECT | 220uF | 20% | 10V |
| C307 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C308 | 1-126-934-11 | ELECT | 220uF | 20% | 10V |
| C350 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C351 | 1-162-205-31 | CERAMIC | 18PF | 5% | 50V |
| C352 | 1-162-203-31 | CERAMIC | 15PF | 5% | 50V |
| C370 | 1-126-933-11 | ELECT | 100uF | 20% | 16V |
| C371 | 1-126-934-11 | ELECT | 220uF | 20% | 16V |
| C380 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C381 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C385 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C386 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C401 | 1-126-936-11 | ELECT | 3300uF | 20% | 16V |
| C402 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C404 | 1-126-933-11 | ELECT | 100uF | 20% | 16V |
| C406 | 1-124-252-00 | ELECT | 0.33uF | 20% | 50V |
| C407 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C411 | 1-126-939-11 | ELECT | 10000uF | 20% | 16V |
| C412 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C416 | 1-126-926-11 | ELECT | 1000uF | 20% | 10V |
| C421 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C422 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C423 | 1-128-576-11 | ELECT | 100uF | 20% | 63V |
| C424 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C425 | 1-126-967-11 | ELECT | 47uF | 20% | 50V |
| C426 | 1-126-965-11 | ELECT | 22uF | 20% | 50V |
| C431 | 1-126-966-11 | ELECT | 33uF | 20% | 16V |
| C432 | 1-128-551-11 | ELECT | 22uF | 20% | 25V |
| C441 | 1-126-933-11 | ELECT | 100uF | 20% | 16V |
| C442 | 1-162-306-11 | CERAMIC | 0.01uF | 20% | 16V |
| C443 | 1-162-306-11 | CERAMIC | 0.01uF | 20% | 16V |
| C461 | 1-126-935-11 | ELECT | 470uF | 20% | 16V |
| C466 | 1-126-935-11 | ELECT | 470uF | 20% | 16V |
| C500 | 1-131-347-00 | TANTALUM | 1uF | 10% | 35V |
| C512 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C516 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C519 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C531 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C533 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C562 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C571 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C572 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C573 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C575 | 1-162-282-31 | CERAMIC | 100PF | 10% | 50V |
| C594 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C595 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C597 | 1-162-294-31 | CERAMIC | 0.001uF | 10% | 50V |
| C598 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C599 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C601 | 1-162-306-11 | CERAMIC | 0.01uF | 20% | 16V |
| C611 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C612 | 1-126-963-11 | ELECT | 4.7uF | 20% | 50V |
| C613 | 1-162-306-11 | CERAMIC | 0.01uF | 20% | 16V |

| Ref. No. | Part No. | Description | | | Remark |
|---|---|---|---|---|---|
| C901 | 1-113-920-11 | CERAMIC | 0.0022uF | 20% | 250V |
| C902 | 1-113-920-11 | CERAMIC | 0.0022uF | 20% | 250V |
| C911 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C912 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| C913 | 1-164-159-11 | CERAMIC | 0.1uF | | 50V |
| | | < CONNECTOR > | | | |
| CN406 | 1-568-683-11 | PIN, CONNECTOR (PC BAORD) 2P | | | |
| CN411 | 1-784-418-11 | CONNECTOR, FFC(LIF(NON-ZIF)21P | | | |
| CN421 | 1-779-285-11 | CONNECTOR,FFC(LIF(NON-ZIF))17P | | | |
| CN501 | 1-784-417-11 | CONNECTOR, FFC(LIF(NON-ZIF)23P | | | |
| * CN502 | 1-568-934-11 | PIN, CONNECTOR 7P | | | |
| CN881 | 1-506-468-11 | PIN, CONNECTOR 3P | | | |
| * CN882 | 1-568-954-11 | PIN, CONNECTOR 5P | | | |
| * CN901 | 1-580-230-11 | PIN, CONNECTOR (PC BOARD) 2P | | | |
| | | < DIODE > | | | |
| D390 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| D391 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| D401 | 8-719-210-21 | DIODE 11EQS04 | | | |
| D402 | 8-719-210-21 | DIODE 11EQS04 | | | |
| D403 | 8-719-210-21 | DIODE 11EQS04 | | | |
| D404 | 8-719-210-21 | DIODE 11EQS04 | | | |
| D406 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| D408 | 8-719-210-21 | DIODE 11EQS04 | | | |
| D409 | 8-719-210-21 | DIODE 11EQS04 | | | |
| D411 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D412 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D421 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D422 | 8-719-109-81 | DIODE RD4.7ESB2 | | | |
| D431 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| D432 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| D433 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| D461 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D462 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D466 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D467 | 8-719-024-99 | DIODE 11ES2-NTA2B | | | |
| D911 | 8-719-911-19 | DIODE 1SS119-25 | | | |
| | | < IC > | | | |
| IC301 | 8-759-553-65 | IC UDA1341TS/N2 | | | |
| IC351 | 8-759-917-18 | IC SN74HCU04AN | | | |
| IC381 | 8-759-634-50 | IC M5218AL | | | |
| IC386 | 8-759-634-50 | IC M5218AL | | | |
| IC401 | 8-759-445-59 | IC BA033T | | | |
| IC406 | 8-759-481-02 | IC M62016L | | | |
| IC411 | 8-759-231-53 | IC TA7805S | | | |
| IC421 | 8-759-633-42 | IC M5293L | | | |
| IC441 | 8-759-822-09 | IC LB1641 | | | |
| IC501 | 8-759-577-40 | IC M30620MC-400FP | | | |
| IC601 | 8-759-917-18 | IC SN74HCU04AN | | | |
| IC611 | 8-749-012-70 | IC GP1F38R (DIGITAL OPTICAL IN) | | | |
| | | < JACK > | | | |
| J101 | 1-784-429-11 | JACK, PIN 4P (LINE (ANALOG) IN) | | | |

| Ref. No. | Part No. | Description | | | | Remark |
|---|---|---|---|---|---|---|
| | | < COIL > | | | | |
| L611 | 1-410-509-11 | INDUCTOR | 10uH | | | |
| | | < LINE FILTER > | | | | |
| LF901 | 1-411-547-11 | FILTER, LINE | | | | |
| | | < TRANSISTOR > | | | | |
| Q191 | 8-729-900-74 | TRANSISTOR | DTC143TS | | | |
| Q291 | 8-729-900-74 | TRANSISTOR | DTC143TS | | | |
| Q390 | 8-729-422-57 | TRANSISTOR | UN4111 | | | |
| Q441 | 8-729-900-80 | TRANSISTOR | DTC114ES | | | |
| Q442 | 8-729-119-76 | TRANSISTOR | 2SA1175-HEF | | | |
| Q911 | 8-729-119-78 | TRANSISTOR | 2SC2785-HEF | | | |
| | | < RESISTOR > | | | | |
| R81 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | (US,CND) |
| R82 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | (AEP,UK,SP,HK,AUS) |
| R101 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R102 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R106 | 1-249-430-11 | CARBON | 12K | 5% | 1/4W | |
| R181 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R182 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R183 | 1-249-433-11 | CARBON | 22K | 5% | 1/4W | |
| R184 | 1-247-864-11 | CARBON | 24K | 5% | 1/4W | |
| R185 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R186 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R187 | 1-249-437-11 | CARBON | 47K | 5% | 1/4W | |
| R188 | 1-249-415-11 | CARBON | 680 | 5% | 1/4W | F |
| R189 | 1-249-411-11 | CARBON | 330 | 5% | 1/4W | |
| R201 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R202 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R206 | 1-249-430-11 | CARBON | 12K | 5% | 1/4W | |
| R281 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R282 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R283 | 1-249-433-11 | CARBON | 22K | 5% | 1/4W | |
| R284 | 1-247-864-11 | CARBON | 24K | 5% | 1/4W | |
| R285 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R286 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R287 | 1-249-437-11 | CARBON | 47K | 5% | 1/4W | |
| R288 | 1-249-415-11 | CARBON | 680 | 5% | 1/4W | F |
| R289 | 1-249-411-11 | CARBON | 330 | 5% | 1/4W | |
| R351 | 1-247-903-00 | CARBON | 1M | 5% | 1/4W | |
| R352 | 1-249-413-11 | CARBON | 470 | 5% | 1/4W | F |
| R355 | 1-249-407-11 | CARBON | 150 | 5% | 1/4W | F |
| R391 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R392 | 1-247-883-00 | CARBON | 150K | 5% | 1/4W | |
| R406 | 1-249-409-11 | CARBON | 220 | 5% | 1/4W | F |
| R407 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R420 | 1-247-881-00 | CARBON | 120K | 5% | 1/4W | |
| R422 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R423 | 1-249-409-11 | CARBON | 220 | 5% | 1/4W | F |
| R424 | 1-249-409-11 | CARBON | 220 | 5% | 1/4W | F |
| R431 | 1-247-807-31 | CARBON | 100 | 5% | 1/4W | |
| R432 | 1-247-826-00 | CARBON | 620 | 5% | 1/4W | |

| Ref. No. | Part No. | Description | | | | Remark |
|---|---|---|---|---|---|---|
| R433 | 1-247-822-11 | CARBON | 430 | 5% | 1/4W | |
| R434 | 1-249-433-11 | CARBON | 22K | 5% | 1/4W | |
| R435 | 1-249-438-11 | CARBON | 56K | 5% | 1/4W | |
| R436 | 1-247-891-00 | CARBON | 330K | 5% | 1/4W | |
| R437 | 1-249-417-11 | CARBON | 1K | 5% | 1/4W | F |
| R441 | 1-249-431-11 | CARBON | 15K | 5% | 1/4W | |
| R442 | 1-249-433-11 | CARBON | 22K | 5% | 1/4W | |
| R443 | 1-249-434-11 | CARBON | 27K | 5% | 1/4W | |
| R509 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R513 | 1-247-903-00 | CARBON | 1M | 5% | 1/4W | |
| R519 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R530 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R531 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R533 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R542 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R543 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R550 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R551 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R553 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R559 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R560 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R566 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R568 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R569 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R571 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R573 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R574 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R575 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R577 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R581 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | (AEP,UK,SP,HK,AUS) |
| R582 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | (US,CND) |
| R587 | 1-249-441-11 | CARBON | 100K | 5% | 1/4W | |
| R592 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R594 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R595 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R597 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R613 | 1-247-895-00 | CARBON | 470K | 5% | 1/4W | |
| R614 | 1-249-437-11 | CARBON | 47K | 5% | 1/4W | |
| R801 | 1-249-426-11 | CARBON | 5.6K | 5% | 1/4W | |
| R803 | 1-249-425-11 | CARBON | 4.7K | 5% | 1/4W | F |
| R804 | 1-249-429-11 | CARBON | 10K | 5% | 1/4W | |
| R911 | 1-249-425-11 | CARBON | 4.7K | 5% | 1/4W | F |
| R912 | 1-249-437-11 | CARBON | 47K | 5% | 1/4W | |
| | | < RELAY > | | | | |
| RY911 | 1-755-324-11 | RELAY | | | | |
| | | < TRANSFORMER > | | | | |
| TR901 | 1-433-702-11 | TRANSFORMER, POWER (SUB)(US,CND) | | | | |
| TR901 | 1-433-703-11 | TRANSFORMER, POWER (SUB)(AEP,UK,HK,AUS) | | | | |
| TR901 | 1-433-704-11 | TRANSFORMER, POWER (SUB)(SP) | | | | |
| ⚠TR911 | 1-433-693-11 | TRANSFORMER, POWER (US,CND) | | | | |
| ⚠TR911 | 1-433-694-11 | TRANSFORMER, POWER (AEP,UK,HK,AUS) | | | | |
| ⚠TR911 | 1-433-695-11 | TRANSFORMER, POWER (SP) | | | | |

**MAIN** **SW** **VOL SEL**

| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| | | < VIBRATOR > | |
| X351 | 1-579-314-11 | VIBRATOR, CRYSTAL (22.5792MHz) | |
| X513 | 1-781-174-21 | VIBRATOR, CERAMIC (10MHz) | |
| ********** | | | |
| * | 1-671-115-21 | SW BOARD | |
| | | ******** | |
| | | < CONNECTOR > | |
| CN601 | 1-506-486-11 | PIN, CONNECTOR 7P | |
| | | < SWITCH > | |
| S601 | 1-572-126-21 | SWITCH, PUSH (1 KEY)(REC POSITION) | |
| S602 | 1-572-126-21 | SWITCH, PUSH (1 KEY)(PACK OUT) | |
| S604 | 1-771-264-11 | SWITCH, PUSH(DETECTION)(1 KEY) | (PB POSITION) |
| ********** | | | |
| * | 1-672-977-11 | VOL SEL BOARD (SP) | |
| | | ****************** | |
| | | < SWITCH > | |
| S951 | 1-771-474-11 | SWITCH, POWER (VOLTAGE CHANGE)(SP) | |
| ********** | | | |
| | | MISCELLANEOUS | |
| | | ********** | |
| ⚠4 | 1-696-586-21 | CORD, POWER (UK,HK) | |
| ⚠4 | 1-696-846-21 | CORD, POWER (AUS) | |
| ⚠4 | 1-751-275-11 | CORD, POWER (AEP,SP) | |
| ⚠4 | 1-783-531-31 | CORD, POWER (US,CND) | |
| 5 | 1-569-008-21 | ADAPTOR, CONVERSION 2P (SP) | |
| 8 | 1-790-509-11 | WIRE (FLAT TYPE) (17 CORE) | |
| 11 | 1-783-140-11 | WIRE (FLAT TYPE) (23 CORE) | |
| 12 | 1-783-139-11 | WIRE (FLAT TYPE) (21 CORE) | |
| 16 | 1-569-972-21 | SOCKET, SHORT 2P | |
| * 258 | 1-667-954-11 | FLEXIBLE BOARD | |
| ⚠260 | 8-583-028-01 | OPTICAL PICK-UP KMS-260A/K1NP | |
| FL771 | 1-517-865-11 | INDICATOR TUBE, FLUORESCENT | |
| HR901 | 1-500-502-11 | HEAD, OVER WRITE | |
| M101 | A-4672-475-A | MOTOR ASSY, SPINDLE | |
| M102 | A-4672-474-A | MOTOR ASSY, SLED | |
| M103 | X-4949-264-1 | MOTOR ASSY, LOADING | |
| S102 | 1-762-148-21 | SWITCH, PUSH (2 KEY) | |
| ⚠TR901 | 1-433-693-11 | TRANSFORMER, POWER (US,CND) | |
| ⚠TR901 | 1-433-694-11 | TRANSFORMER, POWER (AEP,UK,HK,AUS) | |
| ⚠TR901 | 1-433-695-11 | TRANSFORMER, POWER (SP) | |
| ********** | | | |

| Ref. No. | Part No. | Description | Remark |
|---|---|---|---|
| | | ACCESSORIES & PACKING MATERIALS | |
| | | ********** | |
| | 1-418-270-11 | REMOTE COMMANDER (RM-29M) | |
| | 1-558-271-11 | CORD, CONNECTION (AUDIO 108cm)(UK) | |
| | 1-574-264-11 | CORD, OPTICAL PLUG | |
| | 1-776-263-51 | CORD, CONNECTION (AUDIO 100cm) | (US,CND,AEP,SP,HK,AUS) |
| | 3-865-784-11 | MANUAL, INSTRUCTION (ENGLISH) | |
| | 3-865-784-21 | MANUAL, INSTRUCTION | (FRENCH, SPANISH, PORTUGUESE)(CND,AEP) |
| | 3-865-784-31 | MANUAL, INSTRUCTION | (GERMAN, DUTCH, ITALIAN)(AEP) |
| | 3-865-784-41 | MANUAL, INSTRUCTION | (SWEDISH, DANISH, FINNISH)(AEP) |
| | 3-865-784-51 | MANUAL, INSTRUCTION | (ENGLISH, POLISH, RUSSIAN)(AEP) |
| | 3-865-784-61 | MANUAL, INSTRUCTION (CHINESE)(SP,HK) | |
| | 4-981-643-11 | COVER, BATTERY (for RM-29M) | |
| ********** | | | |
| | | ********** | |
| | | HARDWARE LIST | |
| | | ********** | |
| #1 | 7-685-646-79 | SCREW +BVTP 3X8 TYPE2 N-S | |
| #2 | 7-685-133-19 | SCREW (DIA. 2.6) (IT3B) | |
| #3 | 7-685-533-19 | SCREW +BTP 2.6X6 TYPE2 N-S | |
| #4 | 7-621-772-20 | SCREW +B 2X5 | |
| #5 | 7-621-772-40 | SCREW +B 2X8 | |
| #6 | 7-627-852-08 | SCREW,PRECISION +P 1.7X2.5 | |

| | |
|---|---|
| The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.<br>Replace only with part number specified. | Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.<br>Ne les remplacer que par une piéce portant le numéro spécifié. |



99C0988-1
Printed in Japan © 1999. 3
**Published by Quality Assurance Dept.**
**(Shinagawa)**